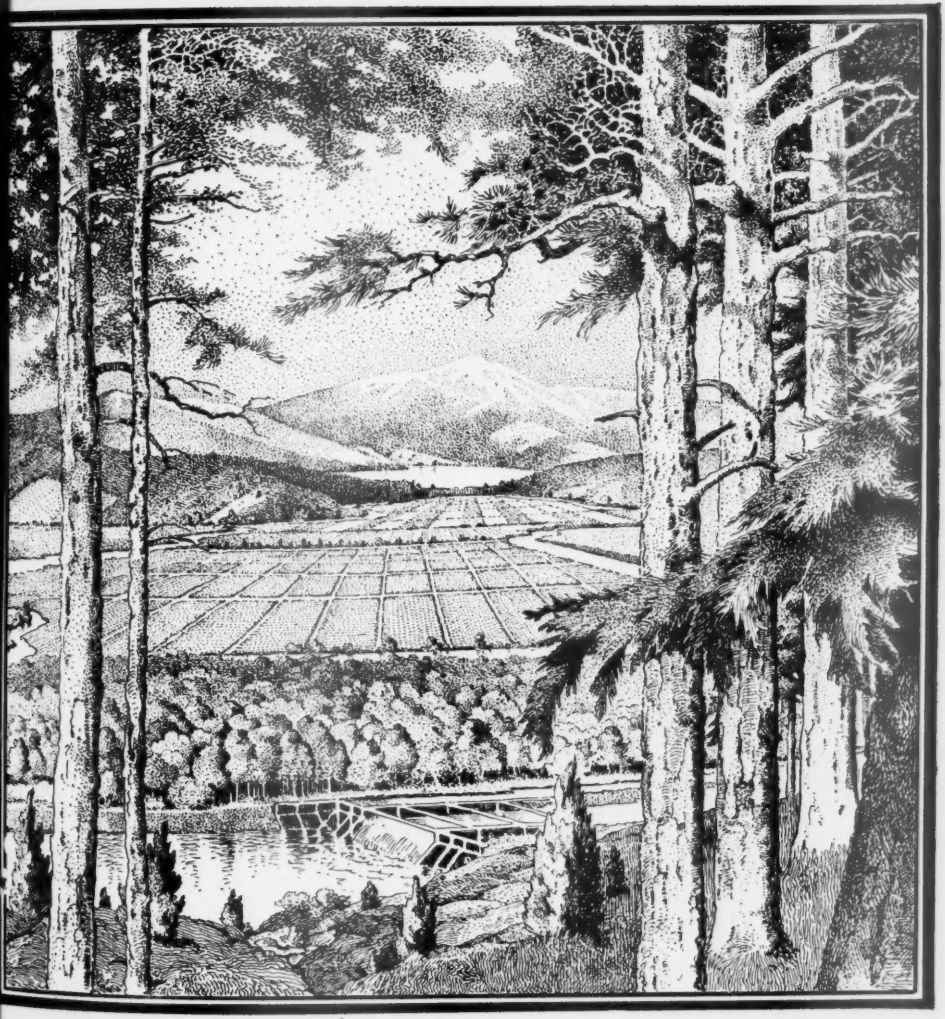
A NEW SPECIES OF JUNIPER. By George B. Sudworth

l. XI—No. 5 MAY, 1905 $1.00 a Year; 10 cts. a Copy

FORESTRY & IRRIGATION



510 Twelfth Street Northwest, Washington, D. C.

RECENT IRRIGATION LEGISLATION

Forestry and Irrigation

H. M. SUTER, Editor

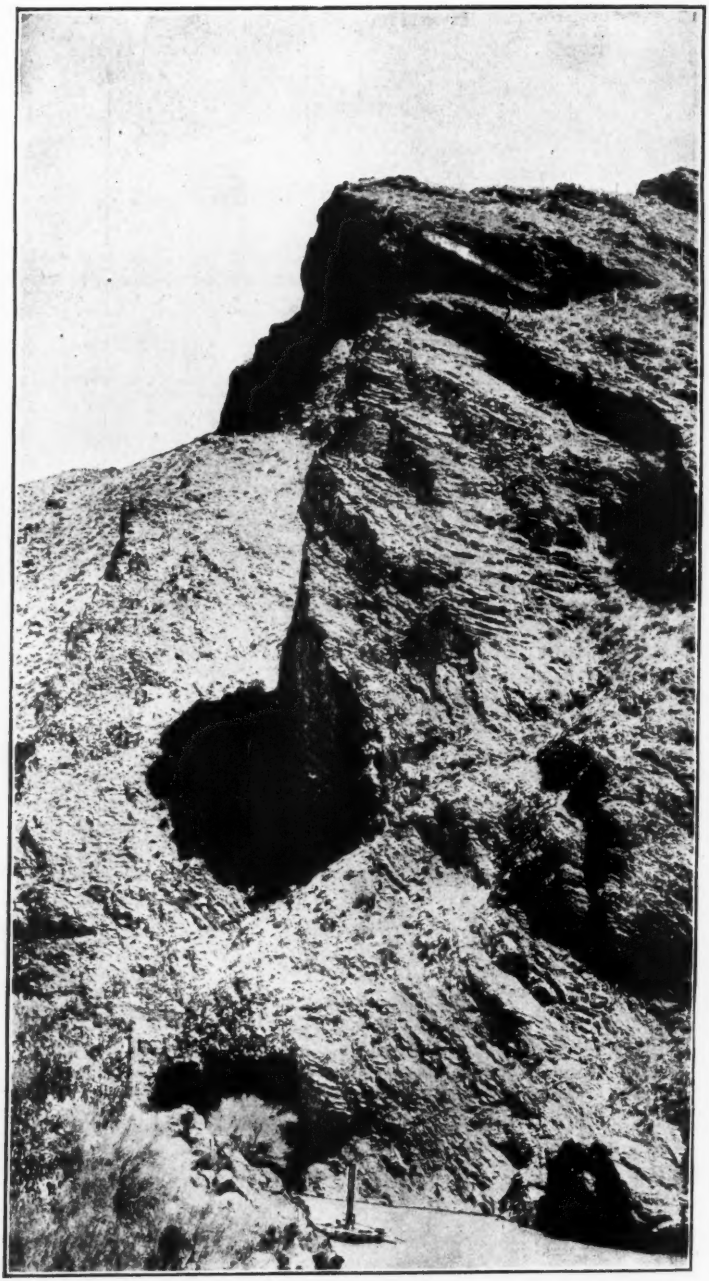
CONTENTS FOR MAY, 1905

FORESTRY AND IRRIGATION is the official organ of the American Forestry Association. Subscription price $1.00 a year; single copies 10 cents.

Entered at the Post Office at Washington, D. C. as second-class mail matter.

Published Monthly at

WASHINGTON, D. C.



San Carlos Dam Site, Arizona; View of Left Bank and Cliff Above.

Forestry and Irrigation.

VOL. XI. MAY, 1905. No. 5

NEWS AND NOTES

To Visit Reclamation Works. A Congressional excursion composed of members of both irrigation committees of both the Senate and House of Representatives, and others, will leave Kansas City on June 1, and will make a personal inspection of a number of the large irrigation projects which the Government is constructing in several of the Western States and Territories.

The first stop will be made at El Paso, where a visit will be paid to the Engle dam site on the Rio Grande. The party will also take a sixty-mile drive into the mountains of Arizona to examine the construction work now well under way on the Roosevelt dam. A careful study will be made of conditions on the Colorado River, the visit extending into the famous Imperial Valley, portions of which are several hundred feet below sea level. In California stops will be made at Riverside, Los Angeles, San Francisco, Redding and Sacramento.

On the 17th of June, the third anniversary of the Reclamation Act, the Congressional party will be at Hazen, Nev., at which time water will be turned upon 50,000 acres of land under the Truckee-Carson project, constructed by the Government, and the first of the large irrigation projects to be put into operation. Leaving Nevada, short stops will be made in Ogden, Salt Lake, at various points in Idaho, Oregon, Montana, Wyoming and Colorado. The party will break up July 4th at Denver, Colorado.

Included in the party are the following: Senator and Mrs. Newlands, Senator and Mrs. Foraker, Senator and Mrs. Fulton, Representatives Mondell, Cooper, Reeder, Marshall, Smith, Jones, Hitchcock, and their wives; Senator and Mrs. Simmons, Senator and Mrs. Dubois, Senator and Mrs. Warren, Judge J. I. Parker, representing the Secretary of the Interior; C. J. Blanchard, representing the Reclamation Service; W. H. Hunter, *Washington Post,* and Mr. Arthur Ruhl, *Collier's Weekly.*

The full intinerary of this trip is as follows: The party will assemble at and leave Kansas City June 1; June 3 to 5, El Paso, Texas; June 5, Maricopa, Ariz.; June 6 to 8, Phoenix, Mesa and Maricopa; June 9 and 10, Yuma, Old Beach and Calexico; June 11, Redlands and Riverside, Cal.; June 11 to 13, Los Angeles; June 14 and 15, San Francisco; June 15, Redding; June 16, Sacramento; June 17-18, Sparks and Hazen, Nev.; June 19-20, Ogden and Salt Lake; June 21-22, Minidoka, Nampa, and Boise, Idaho; June 23 and 24, Portland; June 25, Seattle; June 27, Billings and Toluca; June 28, Cody; June 29, Toluca; June 30, Alliance, Guernsey, Wheatland, and Cheyenne; July 1, Cheyenne and Denver; July 2, Montrose; July 4, Denver.

In passing it should be stated that the special train for this excursion is furnished by the railroads and other expenses are met by members of the party Thus the sensational press will have little opportunity to screech about an expensive "junket" on the people's money.

Grazing on the Forest Reserves. The season for grazing is now nearly over, but from the time the management of the forest reserves was transferred to the Bureau of Forestry

to the present time there have been issued 825 permits for the grazing of sheep, and 4,750 permits for the grazing of cattle and horses on the public forest lands. These permits embrace a total of approximately 1,320,000 sheep and 762,380 cattle and horses which have been grazed on the forest reserves in the past season. The Forest Service still have to issue permits for about 52,500 head of cattle and horses, and 112,000 sheep.

The figures given here apply only to the reserves established for a considerable length of time. In the new reserves that have, or will be created, it will be the policy of the Forest Service, where the livestock industry is of special importance, to allow all of the stock customarily using the range the privilege of grazing for this year, and permits will be issued to graze the stock which are now occupying the ranges, including cattle, horses, and sheep. In the following season if the ranges are found to be over stocked, the number will be gradually reduced until the proper limit is reached. Such reduction will be made gradually and ample opportunity given the stockmen to fit their business to the new conditions. The result of the forest reserve regulations will be thus to protect the stockmen in a better and more permanent use of the ranges.

Forest Reserve Notes. The Plumas Forest Reserve in California, was created on March 27th, with an area of 579,520 acres. Forest Inspector L. A. Barrett has been appointed forest supervisor of the reserve.

Forest Inspector W. R. Slosson has been appointed forest inspector of the entire Santa Barbara Forest Reserve in California. He was formerly in charge of the eastern division only, and now takes charge of the western division as well. The latter was formerly in charge of Forest Inspector B. F. Chawshaw, who is now engaged in the examination of lands in southern California for new forest reserves.

The Pinal Forest Reserve, Arizona, recently created, embraces an area of 45,760 acres, located just south of Globe, and has been placed in charge of Forest Supervisor Thomas Hampton, who is also supervisor of the Mt. Graham Forest Reserve, with headquarters at Thatcher, Arizona. Ranger James C. Brodie has been transferred from the San Francisco Mountains Forest Reserve to this reserve.

The following new reserves have been recently created by presidential proclamation: The Trinity Forest Reserve, in California; the Wenaha Forest Reserve, in Oregon and Washington; the Chesninnus Forest Reserve, in Oregon; the Gunnison Forest Reserve, in Colorado. The Plum Creek and South Platte Forest Reserves, in Colorado, have been combined with the Pikes Peak Forest Reserve, together with other additional new lands. The combined reserve will be known as the Pike's Peak Forest Reserve. The Leadville Forest Reserve, in Colorado, and the Elkhorn Forest Reserve, in Montana, are also very recent additions to the public forest reservations.

Another new forest reserve recently created by presidential proclamation is the Sevier Forest Reserve, in Utah.

Mr. W. A. Langille has been appointed forest inspector in the Forest Service, and has been assigned to take charge of the Alexander Archipelago Forest Reserve, in Alaska.

Timber Sales in Forest Reserves. Considerable business has been done by that branch of the Forest Service which has charge of the sale of timber on the forest reserves, during the last few months. The heaviest sales of timber have been in the Black Hills Forest Reserve in South Dakota, where a removal of all of the insect-infested and diseased timber, including that destroyed by the bark beetle, is being attempted, and such timber in the shape of fuel-wood, fence posts, ties, etc., finds a ready market. Especially is the Forest Service pleased over the coöperation and assistance which residents of the reserve have shown in the removal and sale of tim-

ber; mining companies have purchased large quantities of dead timber for fuel, notwithstanding the fact that they could probably procure coal at nearly the same cost in the end. A branch of Burlington system has purchased considerable timber, where the same was sound enough to permit of its utilization as cross ties, and in general something more than one-half of the amount received during the last fiscal year has been received on account of the sales in this one reserve.

In the other reserves timber sales have been very much scattered, and the cash receipts in the several reserves, while considerable in the aggregate, no particularly large sales have been made in any one of the reserves, with the exception of the Medicine Bow Reserve, in Wyoming, where quite a large amount of tie timber has been sold, and sales are pending involving large amounts of timber to be used by mining companies as props.

As the irrigation projects being pushed forward by the Reclamation Service assume more definite shape, the Forest Service expects to sell large quantities of the timber from the eastern portion of the Yellowstone Forest Reserve, and, in fact, has in prospect considerable sales depending upon the progress of the various irrigation projects that will affect that portion of the country. As these projects develop throughout the arid West, the Forest Service is anticipating a very large increase in its timber sales, and they are preparing to meet this demand by providing a supply. Indications are that a very much larger amount of timber will be sold during the coming year than ever before, and the only really disheartening feature is that where the Bureau of Forestry can afford to sell timber, the demand for it at the present time is slight, as for instance, in Oregon and Washington, where speculators who have acquired timber through the Timber and Stone act, can afford to sell timber at less than its real value, and thus keep prices down below the mark where the government fells it can afford to sell. In many cases timber realized from private holdings more than supplies the demand, and would make governmental timber sales unprofitable. Also the speculator in his sale of timber, takes only the cream of that on the land he has fraudulently acquired, and leaves the best possible conditions for fire. Naturally he also differs with the government as to the amount of timber which it is necessary to leave on the land for reproduction.

The Forest Service has also been gratified with the progress made in the prevention of forest fires, and the cheerfulness with which residents or neighbors of a forest reserve assist in fighting fires, and in general coöperating with the forest rangers. The Service finds that the people who buy timber in the reserves, or have privileges therein, are always ready to take hold with the forest officers to subdue fires, and are willing to make almost any exertion to help them in fire fighting.

Second Growth Long-Leaf Pine. The longleaf pine scene in the accompanying illustration is interesting as showing the inclination of this tree to reforest tracts where it has a chance. It is from a photo by Mr. Romeyn B. Hough, author of "American Woods," taken recently in eastern North Carolina. Before enactment of the present stock laws of North Carolina and stock was at liberty to wander everywhere, the seeds of this tree, with their conspicuous wings, were coveted morsels and quickly devoured, especially by hogs. Now the hogs are not allowed such extensive liberty and are kept out of the tract in question, so that the seeds have had a chance to germinate with the result shown in the picture. In the middle of the field are shown a few old trees, doubtless the parents of those about them. Scattered throughout the foreground are many seedlings, all of this species, just appearing in the grass, and ranging to the height of one's shoulder, and in

the background is a nice forest growth a number of years older, perhaps ten years old. Such scenes as these are common in southeastern North Carolina, millions of little pines of this species and the loblolly pine springing up wherever cultivation is neglected and stock excluded.

Thirteenth Irrigation Congress. The Thirteenth National Irrigation Congress will be held at Portland, Oregon, August 21-24. Governor Pardee, of California, is president of this congress; Mr. C. B. Booth, of Los Angeles, chairman of the Executive Committee, and Mr. Thos. Richardson, of New Orleans, is secretary. The complete program of the congress will be announced at an early date.

Photo by Romeyn B. Hough.

Longleaf Pine Reforesting a Field Where Cultivation Has Been Neglected.

Chair of Lumbering. The Yale Forest School is likely to have a chair of lumbering at a reasonably early date. At the annual meeting of the National Lumber Manufacturers' Association a resolution was adopted to the effect that it will endeavor to raise a fund of not less than $100,000 as an endowment for this purpose. A committee was appointed to carry on the work of raising the money.

This decision to raise funds for the support of a chair in forestry was the outcome of a plea made before the convention by Mr. Gifford Pinchot.

The success of this move will supply instruction of the most valuable kind for young men taking up the profession of forestry. Further, it is remarkably significant of the growing interest lumbermen are coming to have in the practice of forestry.

Forester Wanted. The Cleveland-Cliffs Iron Company, whose forest lands are located in northern Michigan, are considering the employment of a trained forester. He will be charged with recommending a detailed and definite forest policy for the management of the forest lands

of the company, and so far as it is approved, will put it into effect. His salary will be $2,500 a year in the beginning. Those desiring to apply for this position should address such applications to Mr. Gifford Pinchot, Forester, U. S. Department of Agriculture, Washington, D. C.

Prominent Men and Forestry. The interest manifested in the Forest Congress, held at Washington, D. C., in January, has been so great that the Bureau of Forestry has issued a circular containing portions of each of the speeches there delivered. It is intended to spread this circular widely, since it serves to show the opinion of prominent men who have to do with forests and forest products in regard to the application of practical forestry. The publication contains merely extracts of the speeches delivered, and is in no way a complete record of the proceedings of the American Forest Congress. Such a volume is to be issued shortly by the H. M. Suter Publishing Company, of Washington, D. C. The Bureau's circular is being sent to a large list of teachers, lumbermen, legislators, and in general those interested in forest work, and it is hoped that it will pave the way to a closer communication between the Bureau of Forestry and the people of the country.

In this connection, the Bureau of Forestry announces that it desires the name of every person interested in forestry in this country for its mailing list. Such persons will receive the more important of its publications, as they are issued from time to time. It is manifestly impossible to send every publication issued by the Bureau to such a large number of people, but those of general interest will be distributed widely, and all who especially desire it, can be placed on a list so that they will receive notices of special publications as they are issued.

Revision of Forest Policy. During the short time since the Bureau of Forestry was placed in charge of the Forest Reserve work in this country and the administrative work connected therewith, it has been endeavoring to ascertain the weaknesses of the old system of regulations, and endeavoring to discover where improvement might be made in the existing policy of administration. While there has been no public announcement as yet, it is understood that the Bureau will shortly issue a revised manual of regulations, and define its policy in regard to the forest reserves. Such revision will in general be based upon the following points:

Heretofore delays, involving in many cases financial loss, have been occasioned by long-range management of the reserves from Washington, and yards of red tape have bound local reserve officials, so that the smallest privileges were only obtained after lengthy delay and voluminous correspondence. It is now proposed to effect a reform in this respect, whereby the reserve officials will be empowered to dispose of the smallers matter that need attention without direct authorization in each case, being secured from the offices in Washington. This means increased responsibility, and with it additional pay for forest reserve employees.

Control of the reserves will hereafter be more by inspection and less by reports, as in the past. Efficiency will be judged more by results than by methods. In the reserves themselves, provisions are being made for much fuller use of all resources by the people. The sale of timber will be encouraged; free timber will be given those in need of it but unable to buy. The law which has hertofore prohibited the exportation of timber cut in a forest reserve to any other state outside of that in which the reserve is located, has already been repealed by Congress, except in Idaho and the Black Hills Forest Reserve, in South Dakota.

A special study of range conditions will be made to fix the maximum safe amount of grazing on the reserves, and in general all legitimate business enterprises which will not injure the re-

serves will be facilitated and encouraged, with the least possible red tape requirements.

Such a policy is well calculated to enlist the support of the people in the forest reserve idea. Heretofore such strict restrictions have been imposed in the public's utilization of forest reserve privileges and such long delays occasioned by unavoidable red tape methods, that they have come to regard the reserves as a menace to their welfare, instead of a benefit conferred upon them by the government. The new policy will go far toward inducing a change of sentiment in this regard.

Reclamation Service Personals.

District Engineer Geo. L. Swendsen, Salt Lake City, has been directed to continue the hydrographic measurements in Utah which bear upon the various projects, and to take up negotiations with land owners with the objects of bringing to a definite conclusion the early construction of the project determined upon.

The legal department of the Reclamation Service is prepared to give all needed assistance to the water users interested in the Strawberry Valley project in forming the necessary water users' association.

Mr. Harry E. Essley and Mr. Edward R. Furstenfield, both residents of Colorado, have been appointed as bookkeepers and assigned to duty under Engineer I. W. McConnell, at Montrose, in connection with the Uncompahgre Valley project.

Mr. H. A. Comstock, Engineering Aid, Reclamation Service, has been assigned to hydrographic work in South Dakota, and ordered to report to Mr. Raymond F. Walter, Belle Fourche, on April 1st. Mr. Comstock's home is in Vermont.

Mr. Elver L. Shinhur, of Colorado, has received an appointment as Engineering Aid and ordered to report to I. W. McConnell at Montrose, where he will be engaged in connection with the Uncompahgre Valley project.

Mr. R. W. Hawley, Assistant Engineer, has been assigned to work in Nevada, and ordered to report to District Engineer L. H. Taylor, at Hazen. He will be engaged upon drafting work in connection with the Truckee-Carson project. Mr. Hawley's home is in New York, and he is a graduate of the Colorado Agricultural College, having taken a course in irrigation engineering.

The Reclamation Service is planning a very busy season in the North Platte Valley in connection with the work on the North Platte project. The engineer in charge, John E. Field, has directed a number of parties to proceed to the field as soon as conditions permit. At the present time the assignments from the Civil Service to the project includes: One assistant engineer with experience on topographic work; ten engineering aids, three of whom it is intended to train for topographic work on canal surveys; two experienced level men; one constructing engineer draftsman; one topographic draftsman; two assistant engineers, with experience on construction; four assistant engineers, to act as instrument men for last named assistant engineers.

Mr. A. P. Davis, Assistant Chief Engineer of the Reclamation Service, now in the West visiting the several Government projects, will devote considerable personal attention to the various schemes for reclamation in Washington, Oregon, Utah, Idaho, Nevada, Colorado. Under instructions of Chief Engineer Newell he will hold several meetings with boards of engineers in these States, and during his stay will endeavor to meet and discuss important questions with the prominent citizens interested in the various projects.

Mr. Benjamin Franklin, of Ft. Collins, Colorado, will enter the employ of the Reclamation Service on May 15, 1905, as masonry inspector, and will be detailed to the Belle Fourche project, South Dakota.

Mr. Goyne Drummond, one of the best known reconnaissance men con-

nected with the Reclamation Service, has been directed to report to Mr. Cyrus C. Babb, engineer in charge of the Milk River project, to take up the reconnaissance work on Swift Creek, Kennedy, and Boundary Creeks, tributaries to the St. Mary River.

Mr. E. H. Baldwin, who was appointed Constructing Engineer, left Washington April 3, to report to Mr. C. E. Wells, at Casper, Wyo., for duty on Pathfinder reservoirs. Mr. Baldwin is a graduate of Cornell University and was engaged in 1892 as engineer and superintendent of grading new streets in Seattle, Washington. Since that time he has been with the Omaha Canal and Power Co., Omaha, Neb.; Fall River Water Works Co., Mass.; City Engineer's Office, Newton, Mass.; Sewer Div., Street Department, Boston, and from November, 1895, to date, with Metropolitan Water and Sewerage Board of Boston, Mass.

F. W. Huber, Assistant Engineer, now at Berkeley, Cal., will be transferred to L. H. Taylor, Hazen, Nevada, to carry on tests of cement. Mr. Huber was born in Virginia and attended the Baltimore City College and Cornell University. He was engaged in various engineering capacities by the United Railways of Baltimore and the Baltimore and Ohio Railroad Co., up to May, 1903, when he received an appointment as Engineering Aid in the Reclamation Service.

H. C. Hurd, Assistant Engineer, resigns from the service to accept position under Peruvian Government. Mr. Hurd graduated at Princeton and spent some time on the construction of the Broadway Cable road, New York City. He was subsequently engaged with the Nicaragua Canal Commission, the Isthmian Canal Commission, Washington & Annapolis Electric Ry. Co., and as special agent of the State Department on work on Nicaragua Canal Route.

H. T. Paterson, Assistant Engineer, attended Rose Polytechnic Institute, Terre Haute, Ind. Will be transferred from Hazen, Nevada, to Roswell, N. M., to succeed H. C. Hurd, resigned. Mr. Paterson, who had a course in special work at the Missouri School of Mines, was engaged on ditch construction for the Taylor-Park Gold Mining Co.; as assistant city engineer, Colorado Springs; with the Colorado Springs Rapid Transit Co., and with the Denver and Rio Grande Railway. Entered Reclamation Service in October, 1902.

A. P. Morris, Draftsman, will report at Belle Fourche, S. D., for duty, May 1st. Transferred from Washington office.

Jos. H. Root, clerk, transferred from Nautical Almanac Service, Naval Observatory. Has been ordered to report for duty at Hazen, Nevada.

H. P. Seidemann, clerk, transferred from Washington office to Belle Fourche, S. D., for disbursing duties in connection with Belle Fourche project.

A. I. Stiles, Engineering Aid, resigns from service to accept position under Peruvian Government. Mr. Stiles attended the Stanford University, California, and has been connected with the Coast and Geodetic Survey, making two trips to Alaska; also with the Examiner of Surveys, General Land Office.

Chas. E. Slonaker, Observer. Assigned to work under the direction of P. M. Churchill, N. D. Mr. Slonaker was transferred to the Reclamation Service from the U. S. Weather Bureau in 1903.

In order to expedite the preliminary work on the Crow Indian Reservation, the following have been assigned to Engineer Robert S. Stockton, in charge of the reclamation work: C. S. Steiner, L. M. Hatch, Assistant Engineers, and T. M. Gardner and A. M. Bonillon, Draftsmen.

With this addition to the regular force employed it is hoped to finish up the general reports and estimates on the definite projects in the reservation about April 15. The work on the Ft. Custer project is about com-

pleted. The Waco Sanders project will require some additional field work before estimates can be made for the three systems it involves. The first of these includes the Waco ditch, covering 4,000 acres, the Big Horn Junction ditch, 1,500 acres, and a low line gravity canal for the Sanders land covering 13,000 acres, thus giving a total of 18,500 acres under the gravity system.

The second system includes the Waco power and irrigation canal and Sanders and Big Horn Junction pump lines, with a total of 23,100 acres.

The third system includes the Sanders low line gravity canal, 13,000 acres; Waco power and irrigation canal, 4,500 acres, which will supply power to pump from the Sanders low line with a seventeen-foot lift, to cover 5,000 acres, and to pump with a fifty-foot lift to cover 5,000 acres, also to cover the Big Horn flats near the junction of the rivers by a gravity ditch aggregating about 5,000 acres. The surveys have not been made on all of the canal lines, so that estimates of cost at this time are not possible.

The following is a list of the engineers, aids and assistants now under S. B. Robbins, engineer in charge of the Sun River project, Montana:

Preliminary Surveys—F. F. Prendergast, assistant engineer in charge of party; W. R. Ewings, engineering aid, plane table; John C. Cleghorn, engineering aid, instrument man and draftsman; W. C. Newlon, station assistant, Chas. Gordon, rodsman, plane table; Wm. Throm, rodman, plane table; John P. Nelson, rodman, level and transit; Harry Lloyd, axesman; Geo. W. Sherman, Jr., teamster; John Forrest, cook.

Location Surveys—Geo. W. Wood, field assistant, in charge of party; Gordon Edson, engineering aid, transitman; C. E. Shipman, engineering aid, draftsman and topographer; John A. Byron, head chainman; Roy Thomas, rear chainman; F. G. Lewis, back flagman; G. W. Merrill, axeman; Arthur Lambie, axeman; R. W. Randall, levelman; Fred Stewart, level rodman; G. W. Sherman, cook; T. S. Newman, teamster; John Scott, teamster.

Reservoir Surveys—Willis T. Turner, topographer, in charge of party; Arthur P. Porter, engineering aid, instrumentman; F. W. Bird, station assistant; Henry Heinrichs, rodman; Herman Maurer, rodman; F. W. Tozer, cook; Robert Palmer, packer.

The Chief Engineer of the Reclamation Service has accepted the resignation of Mr. William Swift, engineer, effective May 1, 1905. Mr. Swift resigns to accept a position with the Isthmian Canal Commission as resident engineer at $3,600 per annum. He will be allowed 15 per cent. of his salary as a commutation for the maintenance of quarters, free transportation from New York or New Orleans to the Isthmus, six weeks' leave of absence on full pay, medical and hospital service in case of illness, and upon the termination of his services with the Commission will be accorded free passage back to this country.

Mr. Swift, who was born in Connecticut, graduated from the Massachusetts Institute of Technology with the degree of B. S. He has been engaged in various engineering capacities since 1895 with the Boston Water Works, Metropolitan Water Works, Boston; Munson Steamship Line, N. Y.; Rapid Transit Railroad, New York City, in charge of construction of subway; February 24, 1903, engineer in Reclamation Service.

Mr. Swift's services have been eminently satisfactory and his departure from the Reclamation Service is reviewed with regret by his superior officers and by the men who have been engaged under him on engineering work in Montana.

The Secretary of the Interior has executed a contract and approved the bond for the installation of a steam-heating plant in the eight-room school building to be erected in the city of Hobart, Oklahoma. The contract was secured by F. B. Hannan & Company, of Lawton, Oklahoma.

A NEW SPECIES OF JUNIPER FOR TEXAS

BY

GEORGE B. SUDWORTH

Dendrologist, Bureau of Forestry

ELEVEN species of junipers, or "cedars" as they are more commonly called, are indigenous to the United States. Two inhabit the eastern half of the country, one extends across the continent, while the remainder are distributed for the most part over dry foothills, mesas, and slopes of the Rocky Mountain and Pacific regions. With few exceptions, they are trees of poor dry soils, often the only growth on elevated plains and slopes far distant from the timber forests at higher altitudes.

Fig. 1. *Juniperus Pinchoti*, **Showing Habit of Growth.**

Two of the eastern species have reddish heartwood which is exception-

ally durable in contact with the soil and exposed to the weather, posts and fence rails having been known to last forty to sixty or more years. With one exception, the western junipers have a light brown heartwood which is much less durable in an unprotected state than the redwood of the eastern species. Our eastern redwooded junipers are well known both in this country and abroad through their extensive use for pencil wood, while on account of their extreme lasting qualities, the timber is greatly prized also

Fig. 2. Fruiting Branch of *Juniperus Pinchoti*.

for posts and telephone poles. The usefulness of the western junipers is practically unknown, except locally. In very many localities their abundant growth is the mainstay of the rancher both for fuel and for fencing; and in not a few instances the fuel of small foothill towns is derived entirely from near-by juniper. As yet little if any attention is paid, however, to preserving for the future the productiveness of these most important stretches of woodland. A point of interest in this connection is that with the nearly exhausted supply of eastern pencil wood, makers are earnestly seeking substitutes, for which at least one of the western junipers is likely to serve.

The following is a description of a newly discovered species of juniper:

Juniperus pinchoti sp. nov.—As now known, a tree ten to twenty feet in height with numerous stems, three to five inches in diameter, forming more or less dense clumps (fig. 1). The thinnish bark of the trunk is broken longitudinally into narrow, anastomosing scales, which are long persistent. Exteriorly the bark is ashy-gray and a dull cinnamon brown on the inner surface. The bark of the small branches is often divided transversely into long narrow scales. Branchlets somewhat rigid in appearance (fig. 2); those of pistillate trees slender to moderately stout on staminate individuals. Leaves yellowish green usually in threes, but often in twos; closely appressed, acute, thickened, keeled and commonly marked with a depression or glandular pit on the back; about one-tenth of an inch long. Leaves of the young shoots linear-lanceolate, very sharp-pointed, spreading at the tips, one-fourth to one-half an inch long, and with a conspicuous resinous gland on the back (Fig. 3). Flowers and fruiting habit insufficiently known at present; probably a species which matures its fruit the second year after flowering. Mature fruit one-fourth to three-eighths of an inch in diameter, subglobose to slightly oblong, distinctly reddish or copper-brown, with very little or no bloom. Fruit with thick, dry, sweetish flesh and one or two seeds, which are indistinctly ridged, broadly ovate, pointed, lustrous chestnut brown at the apex (hilum very large and bilobed). The wood (not yet technically studied) has distinct narrow rings. Sapwood nearly white and heartwood light brown with a pale reddish tinge; only moderately durable in contact with soil.

The range of this juniper is not

Fig. 3. Sprouting Habit of *Juniperus Pinchoti*.

Fig. 4. Habitat of *Juniperus Pinchoti*.

fully known, but it has been found growing abundantly in Paloduro Canyon in Briscoe, Randall and Armstrong counties, Texas, associated mainly with the One-seed Juniper (*Juniperus monosperma*). The latter species is confined chiefly to steep slopes and broken ground, while the new species is spread over flat bottoms and grassy mesas where there are only a few inches of baked soil over rocks (Fig. 4). The stems of both species are easily killed by the frequent fires of the region from which the One-seed Juniper does not recover, gradually disappearing from burned areas. The new species, however, possesses a marvelous power of sprouting from charred or cut stumps, thus persistently renewing itself and occupying fire-swept localities often to the exclusion of other woody plants. The sprouts spring up in dense clusters (Fig. 3) and grow rapidly for a few years, and then slowly until they attain their full height. Evidence was found of the third generation of sprouts, growing vigorously after fire. The persistent sprouting of this species after fire renders it of very great importance forestrally, in dry regions, since it may be depended upon to renew itself both after cutting and burning. The wood is locally used for fuel and for fence posts.

Credit is due in this connection to Mr. George L. Clothier, of the Bureau of Forestry, who first observed this tree in 1903, and called my attention to its unique and characteristic habit of growth which distinguished it from other junipers of the region. Credit is also due to Mr. H. H. Chapman of the same service, who, a season later, collected additional herbarium specimens and supplied further information concerning the habits and range of the tree.

This species is named in honor of Mr. Gifford Pinchot, whose keen appreciation of the importance of field forest studies made possible the investigations which led to the discovery of this tree.

RECENT IRRIGATION LEGISLATION

Resume of What Was Done at Last Winter's Sessions of the Legislatures in the Irrigation States and Territories

ALL the Legislatures of the irrigation States and Territories held their binennial sessions during the last winter. The interest in irrigation matters in general, and in the Reclamation Service in particular, is shown by the fact that in nearly every State and Territory in the west, legislation in one form or another has been passed with a view to aiding in irrigation development and in the construction of irrigation projects by the Government under the provisions of the Reclamation Act.

ARIZONA.

The Legislatures of this Territory and of Kansas are among those in which irrigation work is carried on to any extent that do not appear to have enacted legislation affecting irrigation.

CALIFORNIA.

Four acts were passed by the Legislature, involving matters concerning irrigation and forestry; namely:

1. An act to coöperate with the United States in the construction of

the Klamath Project, lying both in Oregon and California, by authorizing the United States to change the level of certain lakes lying partly in California and Oregon, and also to cede to the United States any claims which the State may have to lands uncovered by the lowering of the water levels of said lakes. Approved February 3, 1905.

2. An act approved March 20, 1905, appropriating for the period of two years the following sums for coöperation; with the United States Geological Survey for topographic maps, $30,000; gaging streams, determining underground water supplies surveying reservoir sites, etc., $20,000; investigating the economic quality and purity of water, $1,000. For coöperation with the Bureau of Forestry: for studying forest resources and the proper conservation of forests, especially with a view to formulating a proper State policy, $10,000. With the Office of Experiment Stations of the United States Department of Agriculture, for ascertaining the best method of distributing and using water, $15,000. These appropriations are made upon the condition that the proper authorities of the United States shall expend at least an equal amount for the same purposes.

3. A general Forestry Act approved March 20, 1905, providing for the appointment of a State Board of Forestry, also of a State Forester, specifying his duties, authorizing him to appoint subordinate officers, and providing, in general, for an appropriation of $8,800 per annum for the next two years.

4. On March 21, 1905, an act was approved to create a drainage district to be called the Sacramento Drainage District, and to provide, in general for the reclamation by drainage of a certain described district in the valley of the Sacramento River and its protection from floods.

COLORADO.

Definite returns have not been received. It is understood, however, that a bill has been passed providing for a State Board of Land Commissioners for the selection, sale, leasing, and management of State and school lands.

This bill as under consideration provides for the sale to the United States, at a price not to exceed $3.50 per acre, of right of way over State lands for irrigation works, other than canals, tunnels, pipe lines, transmission lines, etc. It also authorizes the State Board of Land Commissioners to sell State lands in conformity with the plans for the disposition of the lands of the United States under reclamation projects.

It provides, further, for a right of way for canals, tunnels, pipe lines, transmission lines, etc., over State lands without charge. An act was passed amending the irrigation district law in regard to the method of taxing the lands in the district, known as the Church Irrigation Bill.

IDAHO.

There have been some modifications of the former very complete irrigation law of the State—among them, a provision to diminish the time in which it will be necessary to begin work upon the structures required to utilize water appropiated under the law; also in cases involving large enterprises, a bond must be filed with the State Engineer for the completion of the works necessary to utilize the water. Provision is also made to increase the duty of water.

A law was passed providing that the State may contribute by annual payments toward the cost of constructing works under irrigation districts where the State lands are benefited.

The former act in regard to the provisions of the Carey Act by which the State would undertake to give deed to the irrigation corporations for the lands not sold within a certain time has been modified so that such deed shall only be issued to actual settlers and thus the State legislation

is placed in harmony with the intent of the Federal statute.

KANSAS.

No returns have been received.

MONTANA.

A bill was approved March 2, 1905, providing for the judicial procedure for the adjudication of water rights under irrigation systems.

An act was approved February 27, 1905, making certain special provisions regarding the appropriation of water by the United States, allowing three years for beginning the construction of the irrigation works.

An act approved February 28, 1905, provides that State lands under projects constructed by the Reclamation Service, shall be sold in conformity with the system established by the government for the disposition of public lands under the project.

The act of March 2, 1905, authorizes the United States whenever it is desired to enlarge any existing ditch for use in connection with a reclamation project, to condemn such right of way and to enlarge the ditch and use it in connection with the owner.

NEBRASKA.

By the act approved March 2, 1905, the sum of $5,000 is appropriated for the years 1905 and 1906 for coöperation with the United States Department of Agriculture in irrigation and drainage investigations in association with the Nebraska Agricultural Experiment Station, upon condition that an equal or greater sum will be spent by the United States for this work.

By the act of April 3, 1905, right of way is granted over lands belonging to the State for ditches, tunnels, transmission lines, necessary in connection with irrigation works constructed by authority of the United States.

An act was passed and approved April 3, 1905, prohibiting the sale of liquor within five miles of any camp or assembly of men where twenty-five or more men are employed, engaged in the construction of any railroad, canal, reservoir, public work, or other kindred enterprise.

The act of April 3, 1905, provides for certain amendments of the law providing for the establishment and management of irrigation districts.

By the act approved April 1, 1905, provision is made to facilitate the filing of stock subscriptions of water users associations organized in conformity with the requirements of the United States under the reclamation act. The effect of this act is to provide for nominal recording fees for these documents, which are necessarily voluminous.

NEVADA.

By the act approved March 19, 1905, the State provides for right of way over its lands for ditches, telephone and transmission lines, constructed by authority of the United States. It provides, further, for the sale of State lands lying within projects under the reclamation act in conformity with the conditions of disposition of the public lands of the United States. It also provides for nominal charges for the recording of subscriptions to stock of water users associations organized in pursuance of the requirements of the United States under the reclamation act.

The act approved March 16, 1905, amends the irrigation law of 1903 in regard to the qualifications and appointment of State Engineer, omitting the requirement that nominations for State Engineer shall be made by the Secretary of the Interior.

The act approved March 1, 1905, is both amendatory of, and supplemental to, the irrigation act of 1903. Section 2 of that act, fixing the maximum amount of water allowed at 3 acre-feet per acre per annum, was repealed, and the provision requiring the Board of Irrigation to ask the Secretary of the Interior or the Director of the Geological Survey to nominate water commis-

sioners was eliminated. New sections were added, providing for the complete control of new appropriations by the State Engineer, and a regular legal procedure was provided for the severing of the water right from land on which irrigation had become impracticable and the removal thereof to new land.

NEW MEXICO.

An appropriation of $2,500 is made from certain funds of the Territory relative to irrigation and reservoir construction to assist in the organization of a water users association under the Rio Grande Project of the Reclamation Service. This act was approved March 13, 1905.

An act was passed covering, in general, the appropriation of water, and providing for a Territorial irrigation engineer; approved March 16, 1905. The act provides that the Territorial irrigation engineer shall at the request of the proper officer of the United States authorized by law to construct irrigation works, set aside from further appropriation under the laws of the Territory any unappropriated waters which may be needed for such government works.

Another act of March 16, provides a method of appropriating water for mining, milling, agriculture, and other useful purposes.

Another act approved March 16, provides for the protection of ditches, pipe lines, reservoirs, etc., from injury, and also prevents pollution of waters used for domestic purposes.

An act approved February 22, 1905, provides for the regulation of the use of artesian wells and prevents waste of subterranean waters.

NORTH DAKOTA.

The Legislatue passed a general irrigation code, following, substantially, the draft of irrigation code prepared last fall by the Reclamation Service, providing for a State Engineer, for adjudication of water rights, and for the regulation of water appropriations. This code was approved March 1, 1905, and provides, further, for the appropriation of the waters of the State where needed for reclamation projects by the United States, allowing a period of three years for beginning construction. It provides, also, for right of way over State lands for irrigation works constructed by authority of the United States, and also that State lands within reclamation projects shall be disposed of in conformity with the provisions for the disposition of public lands.

An act was passed providing for the filing of stock subscriptions to water users associations organized in conformity with the regulations of the United States under the reclamation act, at a nominal fee. This act also contains general provision for right of way over State lands for irrigation works required by such water users associations, and, in addition, authorizes the State and other municipal organizations to join the water users associations when they own land under the project.

An act was passed providing a nominal fee for the organization of water users associations formed in connection with Reclamation projects.

OKLAHOMA.

A bill was passed providing for cooperation with the United States Geological Survey for a topographic survey of the Territory, an appropriation of $5,000 per annum being made to be spent in connection with an equal amount to be allotted by the government.

The Legislature passed a general irrigation code similar to that passed by the State of North Dakota, establishing the office of State Engineer, providing for water appropriations by the United States, for right of way over Territorial lands, and for the disposition of Territorial lands in conformity with the requirements of the government where the same are included in reclamation projects. This act also provides for the filing at a

nominal fee of the stock subscriptions of water users associations under reclamation projects. Although the office of State Engineer is established, it is provided that until an appointment is made, the Secretary of the Board of Agriculture shall perform the duties of that office.

OREGON.

By the act approved January 20, 1905, the Reclamation Service was authorized to utilize Upper and Lower, or Little, Klamath Lakes, Tule, or Rhett Lake, and Goose Lake, in connection with the irrigation operations of the government; and the State ceded to the government all its right, title, interest and claim to the lands uncovered by the lowering of said lakes.

The Legislature passed an act reguating appropriation of water by private parties, providing for appropriations by the United States, and allowing four years for the beginning of construction. Provision is also made for the adjudication of water rights. The office of State Engineer is established. An appropriation of $2,500 annually for two years is made for coöperation with the United States for hydrographic surveys, and an appropriation of $2,500 for coöperation in topographic surveys, upon condition that the United States shall make a like apportionment for such purposes. The act provides that State lands within reclamation projects shall be disposed of in conformity with the provisions of the government for the disposition of its lands. The act also provides for right of way for irrigation works constructed by authority of the United States over State lands.

The Legislature also passed a bill providing for the organization of an irrigation district in connection with the Malheur Project of the Reclamation Service. This bill authorizes the issuance of bonds for the purchase of water rights which might be found necessary in connection with said project.

SOUTH DAKOTA.

On March 3, 1905, the Legislature passed a general State irrigation code, providing for a State Engineer and similar, and general, to the provisions of the North Dakota irrigation code.

TEXAS.

In recognition of the fact that Congress had extended the provisions of the reclamation act to this State, so far as may be necessary in connection with the Rio Grande Project, the Legislature passed an act providing that the United States might exercise within the State all necessary powers for carrying out the provisions of the reclamation act.

UTAH.

The irrigation code of 1903 was reenacted with certain amendments, in order to avoid the possibility of the form of the previous act being declared unconstitutional. There are very few changes of importance in this code. A provision has been inserted exempting the United States in its irrigation construction from the operation of certain sections relating to the examination and inspection of irrigation works by the State Engineer while in process of construction.

WASHINGTON.

An act was passed authorizing the Commissioner of Public Lands to reserve from appropriation the waters required by the United States for reclamation projects, and allowing four years for beginning construction to utilize the same. It provides, also, for right of way over lands belonging to the State for irrigation works constructed by the United States. Said act also provides that State lands within irrigation projects shall be sold in conformity with the provisions for the disposition of the public lands of the United States.

WYOMING.

By the acts of February 8 and 15, 1905, certain minor amendments of

the irrigation law were made. Another act approved February 15, 1905, provides for the condemnation of reservoir sites by any party desiring to construct a reservoir for irrigation or other purposes. Another act of February 15, 1905, provides for a commission of three persons to be appointed by the governor to serve, without compensation, for the purposes of codifying and simplifying the laws of Wyoming relating to water rights.

Another act of February 15, 1905, provides for the limitation of the right to the use of water to the amount required for beneficial use and that the owners of ditches, canals, or reservoirs having a surplus of water and furnishing the same to others shall be considered common carriers and shall be subject to the same laws that govern common carriers.

The act of February 20, 1905, provides for the protection of roads and highways from flooding from irrigated fields and irrigating ditches.

The act of Feburary 21, 1905, relates to the time for the commencement of construction of irrigation works.

Another act of February 21, 1905, prohibits the transfer of water rights when the change would be injurious to other persons, requires the recording of all deeds of transfer of water rights and for injunction proceedings in case of wrongful interference with valid transfers.

GOVERNMENT EMPLOYEES MUTUAL RELIEF ASSOCIATION

There was recently formed at Washington, D. C., an organization that is to be known as the Government Employees Mutual Relief Association. The officers are: President, F. H. Newell, Chief Engineer of the Reclamation Service; vice-president, James B. Adams, Bureau of Forestry; secretary, H. B. Cramer, Geological Survey; treasurer, Mr. Denmark, Geological Survey. Executive committee: Gifford Pinchot, Forester, U. S. Department of Agriculture; Morris Bien, U. S. Reclamation Service, and Geo. Woodruff, Bureau of Forestry.

Experience has shown that from time to time government employees, whose immediate families are not well-to-do, fall sick or die at Washington or elsewhere, having and leaving no means to care for them during sickness or transport their bodies home in case of death. This situation throws expense upon those who are willing to contribute and sometimes causes great hardship.

INSURANCE COMPANIES WHICH ATTEMPT TO FURNISH RELIEF.

Mr. Walcott, Mr. Newell, and Mr. Pinchot, seeing the necessity for some arrangement other than mere charity to meet these extreme cases, appointed a committee to investigate and determine upon a scheme for bringing the majority of employees in the Geological Survey and the Bureau of Forestry into health and accident insurance companies. The committee found that the premiums charged by such companies were practically prohibitive so fas as the majority of their employees are concerned. One example of such a health and accident policy is convincing: A company, in which many of the Geological Survey employees in particular are insured, furnishes for $55 per year a policy which provides $5,000 in case of death by accident with no provision whatever for death from sickness, and $25 per week in case of total disability from accident or sickness. The $55 premium in itself was found prohibitive and, further, the benefits do not meet the needs, because only one-twentieth of deaths occur from accident from which it can be seen that they might have many deaths per year for several years among those holding this policy

and in no case secure relief from the company. Moreover, $5,000 in case of death by accident is practically not more than $250 in case of death from any cause, determined by the ratio 1 to 20.

REASONS FOR SUCH PROHIBITIVE PREMIUMS.

The committee then investigated through the Department of Commerce and Labor, the reasons for these high premiums. It was found that more than 40 per cent. of all premiums paid to accident and health insurance companies go to the expense and profit accounts of the companies, leaving less than 60 per cent. for benefits. In ten western states and territories in 1902, the actual losses incurred were only 46.9 per cent. of premiums paid. With such data in hand the committee readily understands how one of the leading regular companies figures 35 per cent. for agents' expenses and commissions.

PROPOSED SOLUTION OF THE DIFFICULTY.

Hence, the committee investigated means of reducing these excessive expenses if possible. It found several mutual benefit societies of different classes which succeeded in carrying on business for about 5 per cent. of premiums paid in. It therefore proceeded to plan for such a mutual relief association as would seem to cover the exact needs of the situation; eliminating absolutely all such items as agents' commissions, advertising, and rent, and reducing to a minimum administrative expenses and salaries.

The constitution and by-laws submitted provides roughly as follows:

Government to be in the hands of seven directors.

Administrative expenses outside of necessary stationery, stamps, etc., to be not greater than $250 per year.

Membership: All government employees are eligible, classed as follows: (A) Those who are under regular appointments. (B) Temporary employees not under regular appointment.

Fees and dues are as follows: (a) An admission fee of $1 from each new member. (b) Dues at the rate of $12 per year; class A to pay semi-annually in advance, class B, monthly in advance.

Benefits to be as follows: (a) A disablement indemnity of $15 per week for not more than ten weeks when members are not drawing their regular salaries, members of class B, however, not to receive more than 75 per cent. of weekly wages. (b) In addition to all other benefits—doctors', nurses', hospital, and medicine bills not to exceed $40 per week, nor $100 per year. (c) Death benefits as follows: 1. $200 when a member dies at the place indicated for burial in his appliaction. 2. If he dies elsewhere, the actual cost of preparing the body and transporting it to burial place, and $100.

A dividend to be declared at the end of each year dividing the balance of annual dues on hand proportionately among members of class A; not in cash, however, but as a credit on the next year's dues in order to maintain a continuous fund in the treasury. Members of class B do not participate in this dividend.

THE LEWIS AND CLARK CENTENNIAL EXPOSITION

THE exhibit of the United States Forest Service and the United States Reclamation Service at the Lewis and Clark Centennial Exposition will be contained in a special building 60 by 100 feet, located on the site originally assigned to the Fisheries Bureau, and in close proximity to the main government building, of which these exhibits form a part.

In general, the exhibit of both of these branches of the government is

educational in character. Prominent in both the exhibits are maps, models, diagrams, photographs, transparencies and enlarged bromide photographs, illustrating fully all general conditions, and particular phases of the work carried on by these closely allied branches. There are 32 large windows in the building; 16 will give light. On one side of the building eight of those remaining will be used by the Reclamation Service to display large transparencies, 30 by 40 inches, illustrating conditions prevailing in

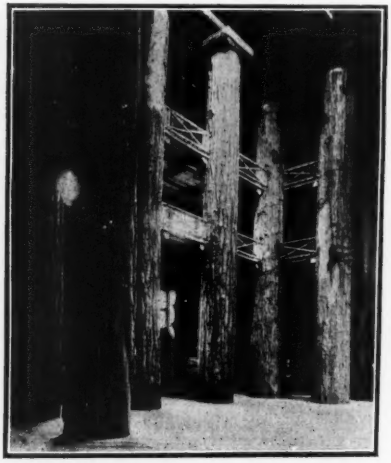
The Forestry Building at the Lewis and Clark Centennial Exposition.

the various projects under consideration, or showing special details of them. The Forest Service will use eight large windows on the opposite side of the building, displaying a large number of colored and uncolored transparencies, illustrating forests and forest conditions, types of commercial and planted forests in the forest and treeless regions of the United States, together with a large number of bromide photographs. The transparencies will illustrate the various problems with which this service has to deal. In this connection, and indeed in the whole exhibit, special attention will be given to the close relationship forest cover bears to the industries directly and indirectly dependent upon water flow.

The Reclamation Service will direct attention to the importance of preventing run-off, and of the storing of water for irrigation and other purposes. The floor space of the building will be devoted to material exhibits of both services. The Forest Service will have material exhibits to further show its various activities. Among the prominent features here will be a display and demonstration of the government work being done in the testing of commercial construction timbers. A beam-testing machine of 200,000 pounds capacity will be in operation on the floor space. There will also be shown here the preservation of construction timbers by special treat-

ments. Methods of planting woodlots, timber tracts, shelter-belts, and windbreaks will be illustrated by a large model, showing particularly the combinations of tree species recommended by the Forest Service for various sections of the United States, in which tree planting is desirable. Various other models, charts, etc., will illustrate other special work which this service is prosecuting.

In the space allotted to the Reclamation Service, in addition to the transparencies occupying the windows, which are to illustrate the conditions prevailing in the various projects under consideration, and special phases of the governmental irrigation work, maps will show the extent and location of the various irrigation enterprises, and several of the more important projects will be represented on the floor space by working models, in which, in some cases, water is used to represent more clearly canals, lakes and laterals.



Interior of the Forestry Building at the Lewis and Clark Centennial Exposition.

Specific and general information both relating to governmental irrigation in its entirety, and regarding each particular locality under consideration by the Reclamation Service will be printed on large cards, 27 by 40 inches, which will be mounted in wing frames for easy access. Another special feature of the exhibit, and one which it is felt will be of especial value to homeseekers and irrigators generally, is the Bureau of Information. Mr. C. J. Blanchard, of the Reclamation Service, will be in charge of this department. He will have an office in the space allotted to the service, and is prepared to furnish all available information, to those interested, concerning the governmental reclamation work in all of the states and territories. A big supply of photographs, maps, diagrams and trite matter, showing the progress of the work of national reclamation, and with information regarding the workings of the National Irrigation Act, and each particular project in the process of construction, or under consideration, is being prepared for distribution. The exhibit of the United States Geological Survey, including that of the Reclamation Service, will be under the charge of Mr. E. T. Perkins, an engineer of the hydrographic branch, assisted by Mr. W. S. Robbins, a member of the geological branch of the survey.

Distinctly separate from the building and the exhibits indicated above, is the State Forestry Building, shown in the accompanying illustrations. The building which contains the government's display in the fields of irrigation and forestry, is to be known as the Forestry and Irrigation Building, and it should be noted that the national forest exhibit is not in the so-called Forestry Building. The latter is one of the most unique structures at the exposition. It is a gigantic log house, built of magnificent specimens of the forest wealth of Oregon and Washington, and forming in itself a goodly display.

The exhibits contained in the building partake more of the character of lumber exhibits. Specimens of the finished products of the forests of Washington and Oregon are exhibited, and examples of logging and lumbering operations indicated. In the

construction of the building no carpentry work was employed, the logs being framed together with tree-nails and old-fashioned wooden pins. The base logs of the building are six feet in diameter and 52 feet long, and above them and forming the remainder of the walls of the building, are the rough trunks, with the bark still on, of trees of varying length, three feet in diameter. Colonnades of immense fir trees, 30 feet high and six feet in diameter, support galleries over the main entrance, and within fifty-two columns of fir and cedar trees 40 feet in length support the roof.

PROGRESS OF THE RECLAMATION SERVICE

Progress from the Various Projects Being Undertaken in the Arid West

UTAH PROJECT UNFEASIBLE.

At the request of citizens residing on Little Cottonwood Creek, District Engineer George L. Swendsen, of Utah, made an examination of a natural reservoir site on that stream, formed by a recession of the bench on either side of the creek.

The engineer reports that the dam would be about 60 feet high and 200 or 250 feet long on top. It would be a rock fill with a tunnel 200 or 300 feet long, of sufficient size to carry the flood waters of the stream, which may amount to 600 or 800 second feet. It is estimated that the dam and right of way for the reservoir would cost not less than $30,000, and the storage capacity with a sixty-foot dam would only be 500 acre-feet.

The board of consulting engineers in session at Salt Lake, recently decided that while the project might prove feasible for a supplementary water supply on very valuable lands, neither the conditions nor the undertaking are of such a character that the reclamation fund could be used in its promotion. These recommendations have been formally approved by the Chief Engineer.

BIDS ON PART OF TRUCKEE PROJECT.

Announcement is made by the Secretary of the Interior that sealed proposals will be received at the office of the engineer of the United States Reclamation Service at Hazen, Nevada, until 2 o'clock p. m., June 15, 1905, for the construction of outlet and controlling works and bridge at Lake Tahoe, Tahoe City, California, involving about 90,000 cubic yards of earth work, 500 cubic yards of concrete, etc. These proposals are for a protion of the Truckee-Carson project.

BIDS FOR LAGUNA DAM.

The Secretary of the Interior has approved the revised draft of advertisement, proposal and specifications for the Laguna dam and sluiceways in connection with the Yuma project, California.

Owing to the informality of a number of bids submitted for this project early this spring, the Secretary of the Interior rejected all bids and ordered a readavertisement.

The specifications call for the excavation of about 282,000 cubic yards of earth, about 305,000 cubic yards of solid rock, the placing of about 305,000 cubic yards of solid rock in the dam and masonry core walls, the building of 27,150 cubic yards of concrete, laying 80,000 square yards of paving, and furnishing and driving about 53,000 linear feet of sheet piling.

The bids will be opened at 2 o'clock,

Monday, June 15, at the office of the United States Reclamation Service, 1108 Braly Building, Los Angeles, California.

BISMARCK PUMPING PROJECT.

Chief Engineer Newell has directed that preliminary surveys in connection with the Bismarck, North Dakota, pumping project be pushed to completion this season, in order that the land owners in that section whose property will come under this project may have a clear understanding of all plans of the Reclamation Service, and a full knowledge of the cost of the water rights.

At the present time the sentiment of the people apparently is not generally favorable to the project. Conditions resemble those which prevailed in sections of Oklahoma, where land owners declared that any discussion of irrigation was certain to injure property values, and that irrigation was not essential anyway. A great light has dawned on Oklahoma since that time, and the people are now enthusiastically coöperating with the government in its efforts to establish irrigation works in the territory.

The past few years in North Dakota have been years of ample rainfall, and the farmers are prone to forget the periods of drouth, which, at intervals, prevail there to the destruction of crops, and certain losses to the agriculturists. It is hoped that when the completed plans are presented there will come a change of sentiment, and North Dagota will evince a readiness to coöperate with the Reclamation Service. If no such change occurs the amount set aside for the construction will be applied to works elsewhere, and the Bismarck project will be held in abeyance for several years.

WITHDRAWAL OF MONTANA LANDS.

The Secretary of Interior has temporarily withdrawn from any form of disposition whatever the following public lands in the State of Montana, under the first form of withdrawal authorized by the Reclamation Act of June 17, 1902, in connection with the Ft. Buford project. Montana principal meridian, northwest ¼ Sec. 6, T. 19 N., R. 58 E.

NORTH PLATTE PROJECT.

The Reclamation Service is pushing work on the North Platte project with the utmost dispatch. Secretary Hitchcock has authorized the advertising of bids for the construction of the Pathfinder dam and auxiliary works at a point about 50 miles southwest of Casper, Wyoming.

The bids will be opened at the office of the Reclamation Service, Chamber of Commerce Building, Denver, Colo., at 2 o'clock, Thursday, June 15, 1905.

CONTRACT LET FOR ROOSEVELT DAM.

The Secretary of the Interior has executed a contract on behalf of the United States Government with John M. O'Rourke and Co., Galveston, and has approved the bids of the contractors for the construction of the Roosevelt dam in the Salt River project, Arizona. The contractors' bid is $1,147,000, and the contract provides that a sufficient force and plant shall be at work within 90 days to complete the dam to a level of 150 feet above datum in the period of two years.

MAIL SERVICE IN MONTANA.

The attention of the Director of the Geological Survey has been called to the very poor mail service between Glendive and Mondak, by the engineers engaged upon the Fort Buford project. At the present time mail leaves Glendive, Montana, Mondays, Wednesdays and Fridays and goes as far as Ridgelawn, 65 miles, returning to Glendive the following day. The mail is taken from Ridgelawn the next morning after it arrives from Glendive and goes on to Mondak.

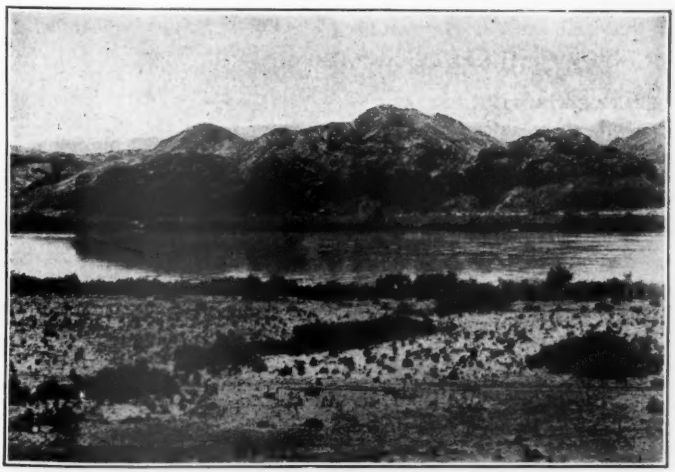
With the initiation of the construction work on this project it will be absolutely necessary that daily mail be run from Glendive to Mondak and return, a distance of 80 miles, and it is probable that a request will be made for a rural free delivery route.

Yuma Dam Site, Colorado River, Left Abutment, Arizona.

The headquarters of the Government men and all camps are located near the stage line, but are distant from postoffices, and the present system of mail delivery causes troublesome delays and many mistakes.

LANDS FOR CLEAR LAKE PROJECT.

The Secretary of the Interior has formally approved, subject to the future determination to construct the project, the purchase of 15,000 acres of land belonging to the Jesse D. Carr Land and Live Stock Company, at Clear Lake, Cal. The purchase price is $187,500, and includes with it the riparian rights of the company in the Clear Lake reservoir site and along Tule Lake, besides the canals now constructed on the lands of the com-



Yuma Dam Site, Colorado River, Right Abutment, California.

pany. These lands and rights constitute an essential item and a valuable concession in the Klamath Falls project.

ARTESIAN WATER FOR LOCOMOTIVES.

Congressman Martin, of Deadwood, South Dakota, states that the Chicago Northwestern Railroad Company has under consideration the advisability of sinking an artesian well at Buffalo Gap, in Meade county, South Dakota, for the purpose of obtaining a supply of water for use in locomotive engines.

The engineers of the company have fears that if an artesian well should be obtained the water would not be suitable for engine use. Mr. Martin has requested the Geological Survey to furnish any information available on this subject.

The Director of the Geological Survey states that there are some grounds for the fears of the Northwestern Railway Company that artesian waters from the Dakota sandstone at Buffalo Gap might be too much mineralized for engine use. The waters from this source are variable in character, but it is believed that the chances are very fair that the waters at Buffalo Gap will be satisfactory, and it is thought that the prospects are sufficiently favorable to merit a trial.

COOPERATIVE WORK IN NEBRASKA.

The U. S. Geological Survey and the State Engineer of Nebraska have formulated a plan for coöperation in the collection of hydrographic data in that State. The Hydrographic Branch of the Survey, through the district office at Denver, will maintain a total of ten river stations. The State Engineer will arrange to make all necessary gagings at the various stations to insure a complete and satisfactory rating curve of each, covering the range of gage heights for the year. The services of the State Engineer's assistant or assistants making these stream gagings will be paid by the United States Geological Survey.

All records of gage heights and stream gagings are to be transmitted by the observer directly to the Denver office on the regulation cards. Copies of the same are to be furnished to the State Engineer at the end of each season or year, or at any other time on request.

The travelling or field expenses incurred by the assistants of the State Engineer in securing these data are to be paid by the State Engineer's office. The Geological Survey will issue instructions concerning the method and proper manner in which all field data are to be collected, and will furnish a reasonable number of current meters which are to be used in the work.

This coöperation will insure a decided extension of the work, the importance of which is recognized by both the agricultural and manufacturing interests.

PURCHASING IRRIGATION DITCHES.

The Secretary of the Interior has approved provisionally the purchase of two canals, the Adams ditch and the Ankeny canal, in the vicinity of Klamath Falls, both of which are to be used in connection with the Klamath irrigation project in Oregon.

The Government had previously secured options on these irrigation systems, and the action of the Secretary provides for their purchase as soon as the final plans of the engineers for the construction of the large project have been accepted.

THE PRODUCTION OF MAPLE SUGAR

The Bureau of Forestry Seeks to Develop and Extend the Industry

THE Bureau of Forestry has been studying the maple sugar industry with the view of securing a larger use of the maple forests. Since 1850 the area of maple sugar farming has greatly changed and shrunk. In early days maple sugar was commonly made, even in many parts of the South, because cane sugar was virtually unobtainable. No longer is there even a limited production in South Carolina, Georgia, Alabama, Mississippi, Louisiana, and Arkansas. This is because cane sugar can now be bought everywhere at a low price, and is preferred to maple sugar for sweetening. In Indiana, Michigan, and Illinois the maple trees have been extensively cut for lumber, thus reducing the opportunity for tree tapping. In those States also the markets are glutted with imitations, which removes the incentive to extending the industry. In other States, as in western Maryland, West Virginia, Ohio, New York, and in New England, the maple sugar industry has held its own or been increased.

The best sap flow is secured in the cooler northern States, yet good results can be expected in most of Pennsylvania and West Virginia, in western Maryland, all of Indiana and Kentucky, eastern Tennessee, and western North Carolina. At present the largest producers of sugar maple products are Ohio, Vermont, and New York. The sugar and black maples yield the most and the best sap, although some other species of maple may be worked to advantage when neither of these is available.

The maple is a hardy and vigorous tree and readily reproduces itself, so there need be no fear of failure of sap supply. For sap production the all important consideration is for the tree to have a full and heavy crown. Yet it should also grow under forest conditions which maintain a ground cover of litter and humus.

As a result of the study recently made definite directions for the management and improvement of existing groves, and for the establishment of new ones in suitable localities and under different conditions, have been prepared and will soon be published. Many valuable data regarding the profit in making maple sugar were also collected. From these it appears that a farmer can easily clear about $3 an acre from a sugar grove. The expenses in this estimate are placed at a maximum; all the labor and hauling are charged in at market rates, though as a matter of fact the sugar season falls at a time when the farmer has little other employment for himself or his horses. In actual practice, for the farmer who can do most of his own work, the profit should be considerably larger. And the land thus utilized will yield little or nothing under any other use.

The old method of collecting the sap by making a diagonal cut in the tree was abandoned long ago because it injured the tree so that it could be worked for but a few years. The approved practice now is to bore a hole one inch deep and three-eighths of an inch in diameter into the sunny side of trees over 12 inches in diameter, and to make but one hole in each tree, except possibly where the trees are especially large and productive. Vast improvements have also been made in appliances for handling the sap and boiling it down to sugar and syrup.

Maple trees now furnish but a small per cent. of the commercial maple syrup and sugar. While the demand for both these commodities has constantly increased, the output from ma-

ple trees has decreased during the last twenty years. The trade has been supplied only by radically adulterating the pure goods, or by manufacturing a product entirely from foreign materials. It is conservatively estimated that seven-eighths of what is sold as maple syrup and sugar is a spurious article. Most of the fabrications are entirely harmless, but they are not the real thing. Those fortunate enough to have eaten the genuine article will always demand it, and conditions should be such that they may get it, if they are willing to pay the price.

The fault does not lie with the producers, those who tap the trees and reduce the sap to syrup and sugar, but with the middlemen who buy the sugar and mix and adulterate it most profitably for themselves. The extent of this adulteration is illustrated by the fact that while the amount of the raw product has decreased, the whole quantity has largely increased and its market price has been reduced. Of late years the price has fallen in direct relation to the decrease in the price of cane sugar.

The most common substitutes used in the adulteration of maple sugar and syrup are other sugars and glucose. Much of the so-called maple syrup on the market is nothing but a combination of sweets with a little maple molasses added to give the maple flavor. There is also a maple syrup which contains no maple at all, but the flavor is obtained by adding to the compound an extract of hickory bark. This extensive adulteration forces the producers of pure maple syrup to compete with cheap imitations. The price of their raw product is kept down, and the forests of maple are not as profitable to their owners as they otherwise might be.

The consumer is entitled to pure goods, and the producer is entitled to have his syrup and sugar bought and used for what it is. The remedy is in the hands of the producers, and they can effect a change for the better in two ways. They can associate themselves in State and large local companies, and, by selling direct to consumers, cut out the middlemen; and they can also put their produce on the market in the form not of sugar but of syrup, which is most in demand. The public will not object to paying a little higher price for guaranteed pure goods. The cost of making and handling syrup might be a little more than that of sugar, but the net returns would be larger, the public better served, and the maple sugar industry profitably extended. The association plan has been adopted in Vermont with excellent results. Annual meetings are held, through whose influence improved methods of production have been adopted, a central market established, and a registered trade-mark created which is a guarantee of absolute purity. In this way a trade of good proportions has been built up.

RE-CONQUEST OF NEVADA

BY

GUY ELLIOTT MITCHELL

Secretary, The National Irrigation Association

HAS Nevada always been an arid and desert region? Its geological records, as indelibly carved in sandstone and granite, showing the shore lines of ancient lakes, proclaim that it has not, but that at one time a vast body of water, as great in area as Lake Erie, covered a portion of the State. To-day, however, the aridity of the country is unquestioned and the

350,000 acres, to part of which Uncle Sam is about to apply water. will practically double its irrigated area and its agricultural population.

Nevada's ancient inland sea is known as Lake La Hontan; it was one of the several great pre-historic lakes distributed over the Great Basin of the arid region, among them Lake Bonneville of which the Great Salt Lake was the deepest portion. Its area was nine times greater than the Great Salt, or almost as large as Lake Michigan and much deeper.

The contracted remains of Lake La Hontan, in Nevada, are found in Pyramid Lake and a number of other small enclosed lake which were the deepest portions of the ancient lake. Since these large pre-historic lakes were land-locked and did not overflow, it follows that the rainfall which fed them was much heavier than it is to-day.

Should conditions revert, many of the important points situated in the Great Basin would be hopelessly flooded, such for instance as the Mormon Temple, which would stand in 850 feet of water, while 700 miles of railroad would be submerged.

These pre-historic lakes are said to be of very recent origin—that is, recent by the geologists' count—perhaps 30,000 or 40,000 years old. Fossils have been found showing the presence of primitive man along their ancient shores and embankments, which in many instances, are as perfect in contour and as distinct as if the waters had receded only a few years since. These lakes included such arid and fear-inspiring localities of to-day as the Black Rock Desert, Skull Valley, Death Valley, and a score of other places where the bleached bones of man and animal attest to an awful lack of water.

This first irrigation work of the national government, which is to be celebrated by the turning of the water into the gigantic ditches next month, is the largest project which has been definitely outlined and approved under the irrigation act—known as the Truckee-Carson project. When completed it will involve the expenditure of approximately $9,000,000 and will reclaim 350,000 acres of desert land. That portion of the system now completed consists of a canal 31 miles long to take water from the Truckee River and convey it to the Carson River, where a large storage reservoir is projected. Just below this reservoir site, the waters of the two streams will be led out upon the plains by two canals, with a combined capacity of 1,900 cubic feet per second. Some 50,000 acres are to be irrigated this spring, for which 200 miles of small distributing ditches have been dug.

The Secretary of the Interior has set aside $2,740,000 of the Reclamation Fund for the initial work, and by the time this has been expended about 100,000 acres will be under canals, and the settlers will be returning in annual payments the original investment. The money thus received will be used as a revolving fund for the completion of this project. The land has been divided into farm units of 80 acres, and the cost of reclamation will be $26 per acres. Work is being commenced this spring on regulating gates at the outlet of Lake Tahoe, located in California, but whose waters will be used to reclaim the fertile Nevada soil. Future plans involve the draining of Carson Sink, 25,000 acres in extent, which overflows in years of heavy rainfall, and the reclamation of lands in the upper Truckee and Carson valleys. As these large areas are gradually brought under irrigation a greater water supply will be required and nine additional reservoirs will be constructed, with a combined storage capacity of over a million and a quarter acre-feet (an acre-foot equals one acre, one foot deep).

The soil under this project is very fertile, and deciduous fruits such as apples, pears, peaches, grapes, all the berries and vegetables produce luxuriantly. Wheat, oats, potatoes and alfalfa are the staple crops. The lands

are tributary to the Southern Pacific, the Nevada, California and Oregon, and the Virginia and Truckee Railroads, and the recent enormous activity in gold and silver mining in Nevada insures a nearby and profitable market. At the same time the supply of food products will greatly reduce the cost of living and further stimulate mining development.

The fact that a very large portion of the lands included in this project belong to the government and have been withdrawn from speculative entry under the desert and other land laws, is a matter for congratulation. Nevada's past history has been one of land monopoly, in fact it has been said that the State was long since stolen by land robbers. In area Nevada is three times the size of Indiana, but her population is scarcely sufficient for a single small county. The popular vote of last year was but little over 12,000. The bulk of the inhabitable lands are in the hands of a few great land owners, while the opportunity for settlement and increased population has never been extensive. Nevada's land history is one which can be studied with profit by those who are searching for light on the question of proper administration of the public domain. With exception of the influx of immigration due to mining excitement, the population is as a standstill and must continue to remain so until farm lands are thrown open to settlement in small tracts through government irrigation.

Cement Lined Canal, Nevada Government Irrigation Works.

When the State was admitted to the Union, in place of receiving the usual donation of alternate school sections—16 and 32 in each township—it secured a flat grant from the government of two million acres of public land to be located wherever its law-makers saw fit. The State legislature passed as much as desired of this great and valuable resource into private ownership of stockmen, at as low a figure as 25 cents an acre. These lands have been

located up and down the sides of every river and stream and around every spring and water hole in the State, so that while Nevada has to-day some 60,000,000 acres of public land, there is not a quarter section of it upon which a homesteader could make a living. The land granted to the State for school purposes—disposed of by the State for a mess of pottage—controls the lands fo the State.

The government's irrigation plan, when worked out, will immediately double Navada's population; it will provide a new life-blood of settlement and citizenship for a region of unsurpassed agriculture.

This great reclamation scheme for the rebuilding of Nevada is being carried into operation by Engineer L. H. Taylor, under the supervision of Frederick H. Newell, Chief Engineer of the Reclamation Service. It will afford the first practical example of the operations of the new national irrigation law.

PROGRESS OF THE SALT RIVER PROJECT

Work Going Forward Rapidly on this Great Reclamation Scheme

THE town of Roosevelt, Arizona, humming as it is with the activities of it 3,000 inhabitants, is doomed. Its lease on life is only three years long. In 1908, when the engineers of the Reclamation Service shall have completed the highest dam in the world, Roosevelt will lie 172 feet below the surface of the water in the reclamation reservoir. Work has been in progress there for about a year, but men are laboring now, night and day, in three shifts of eight hourse each, in order that no more than three additional years may be consumed in the task. Then Roosevelt will be no more.

Shut in by mountains as the valley of Salt River is at this point, there is no place else where the men who are constructing the dam for the Salt River reclamation project might build them a city except in the very valley that is destined to be submerged. The town or camp of Roosevelt is situated partly on the flat along Salt River and partly on the hillside above the high water mark of the reservoir. In the lower part of the camp are located the temporary power plant, the commissary, the corral, the hospital, and the dwelling tents of employees of the Reclamation Service of the United States Geological Survey and of contractors working for the Government. In that portion of the camp known as "Roosevelt-on-the-Hill" are the cement mill, an office building, dining hall and kitchen, numerous tent houses, and several frame structures erected for the use of the engineering force and their families.

Three mail and passenger stage lines connect Roosevelt with the outside world. The Globe line, which is about 42 miles long, provides a daily stage service from Globe, which has Southern Pacific Railroad connections. By means of the Mesa line, passengers and mail can be be brought to the dam in one day from Phoenix, which is the center of the territory. The route, which is about 60 miles long, runs through the most picturesque part of Arizona. Capitalists are even now considering the advisability of putting on an automobile line from Proenix to the dam, of constructing a trolley line between the two points, and of erecting a tourist hotel in the

mountains not far from the dam site. A third stage line, also in daily operation, is the one between Payson and Roosevelt. It is about 63 miles long.

The contract for the Roosevelt dam has been recently given to J. M. O'Rourke & Co., of Galveston, Texas, and the most serious work of the project will soon be under way. During the past year, however, a vast deal of important preliminary work has been accomplished by the inhabitants of Roosevelt. A temporary power plant, between Phoenix and Roosevelt. A road to the timber in the Sierra Ancha Mountains has also opened up a new country. Altogether, it has been necessary to construct about 80 miles of road.

Much of this work has been done under most unfavorable circumstances. From February until the end of March there was almost continuous rain and snow. Never in the history of Arizona has snow been deeper than it was last winter, and the chances for high water during the entire summer

Salt River Canyon, Arizona, Looking Downstream from Point About Half Mile Above Dam Site.

a cement mill, an ice plant, a lighting plant, and a saw mill have all been completed. The power canal, which will furnish water power for the generation of electricity to operate all the work, will be done in a few months. A telephone line connecting the headworks of the power canal, about 18 miles above Roosevelt, with the Arizona dam, which is about 30 miles from Phoenix, has also been installed. In the face of great engineering difficulties, a wagon road has been built are, unfortunately, almost certain. During the greater part of March the road to Globe was impassable and the Gila Valley, Globe, and Northern Railway was out of commission. The Southern Pacific bridge across the Gila at Maricopa was rebuilt half a dozen times during that month. It is apparent therefore that materials for construction work were not hauled into camp very rapidly during part of the past winter.

It might be said of the unwelcome

rains, however that they rather improved the power canal by consolidating the banks. The grading work for this canal was done by Sherer & Co., of Los Angeles, and the tunnel work by John Tuttle, of San Francisco. Water will be diverted from the river to the power canal about a quarter of a mile below the confluence of Pinal Creek and Salt River. The canal is 19 miles long and its construction has involved the excavation of about 600,000 cubic yards of material and the driving of nearly 9,000 feet of tunnel.

Until power can be obtained from the power canal, a temporary steam plant has been built for the purpose of furnishing power to the machine and wood shops and for running the cement mill. It has also run the hoist for the material, which has to be elevated 300 feet to the cement mill, and has furnished light and power for drilling operations in the tunnels at the dam.

The cement mill, which has been ready to run since the middle of February, is now in operation. The fuel used in burning cement in the kilns is crude petroleum from the California oil fields. The beginnig of manufacturing cement was delayed through the fact that only one tank of oil reached the mill during March. That had been two weeks on the road, weighed about 2,500 pounds and required six horses to haul it. The other oil tank got stuck in the mud between Globe and Roosevelt and had to be abandoned.

View in Sierra Ancha, Salt River Watershed.

About 400 tons of machinery and 60 tons of structural iron have gone into the construction of the cement plant. The ball mills weigh about 12 tons each; the tube mills, when ready for grinding, weigh about 20 tons, the crusher 15 tons, and the rotary kilns for murning the cement are 70 feet long and weigh 40 tone each. Attached to the mill is a well-equipped laboratory under the charge of two

chemists, who will devote all their time to standardizing the cement materials and testing the products of the mill. It is expected that about 200,000 barrels of cement will be required in the construction of the Roosevelt dam, the power canal, and the various Tonto improvements. The cement used in the preliminary work costs $5.35 a barrel delivered at the point where it was used. Bids were later received for furnishing cement at $4.81 a barrel. It will cost the Government $1.60 a barrel to make the cement on the ground. If the cost of the plant, $120,000, be added to the cost of the 200,000 barrels of cement required, the total cost of the Government cement will still be only $2.20 a barrel. This means a saving of $2.61 a barrel, or a saving of $522,000 on the entire work. After the dam and canal have been completed, the cement plant will still be capable of further use, and considerable salvage may doubless be realized.

Two new gaging stations were established on Little Colorado River and its tributaries during March. A party has been surveying a possible power canal on Verde River, the power to be used to supplement that obtained from the dam when it is desirable to store water in the reservior. It is proposed to do considerable reconnaissance work in the northern end of the Territory, at the headwaters of San Pedro River and on San Carlos and San Francisco Rivers.

Mr. Louis C. Hill is the supervising engineer in charge of thework on the Salt River project.

RECLAIMING THE ARID LANDS OF THE NORTHWEST

BY

THOMAS COOPER

Land Commissioner, Northern Pacific Railway.

NO single feature of the development of the Great Northwest—the states of North Dakota, Montana, Washington and Oregon—is more significant of future greatness than the work done during the last decade in bringing the semi-arid land under cultivation and in developing methods by which great areas are made immensely productive.

Irrigated lands produce never-failing crops. The land and the water, primary elements in crop production, are known quantities and can be depended upon. Adjacent to the principal areas of the Northwest in which irrigation development is now in progress are splendid home markets waiting to take all that the land will produce.

The land to be brought under cultivation through the work of the United States Reclamation Service, the organization through which the Federal Government is carrying out the largest scheme of irrigation development and irrigating works yet attempted, will be thrown open to settlement as fast as the water is supplied, under terms which, from the standpoint of the settler, will be very reasonable.

Land irrigated by the United States government will be subject to entry under the Homestead act, as modified by the Reclamation act. The cost of irrigation works and the expense of furnishing water to a given district will be apportioned pro rata to the acreage benefited and the cost per acre, thus obtained, is what the settler pays for the land and the water rights, in ten annual payments without interest.

The cost per acre varies with the cost of the project, the term used by the government engineers to designate irrigations plans and work in a given district. On projects so far undertaken the cost runs from $15 to $30 an acre. The Reclamation Service carefully considers the character of the land, its proximity to markets and transportation facilities before undertaking any improvements, in order to make sure that there will be left an ample margin of value above the cost of the work when completed.

The purchase money received by the government goes back again into the reclamation fund to be used over and over again in building other canals and in supplying water to new districts.

The irrigation projects along the lines of the Northern Pacific Railway on which work will probably be inaugurated during the present year by the government Reclamation Service are the Lower Yellowstone Canal, which will irrigate 40,000 acres in Montana and 20,000 acres in North Dakota, and several others of importance. The Yellowstone canal will take water from the Yellowstone River at a point about thirteen miles below Glendive, Mont. An association of the land owners under the canal has been formed as required by the Reclamation Service and is called the Lower Yellowstone Water Users' Association. It is expected that all of the necessary preliminary work will be completed within sixty days, after which contracts for the construction of the canal will be awarded.

On the Crow Reservation several canals are contemplated by the Reclamation Service, one of which, known as the Huntley Project, will irrigate 30,000 acres and will be put under contract within a few weeks, it is expected. The lands irrigated by this canal are in the vicinity of Huntley Station, on the line of the Northern Pacific, a short distance east of Billings, Mont. It is expected that at least two other good irrigation projects will be developed on the Crow Reservation, as surveys already made indicate that they are feasible and that their cost will be low.

In Washington the Reclamation Service is endeavoring to remove the obstacle in the way of the Washtucna Coulee Project, which is to irrigate 100,000 acres of land in the vicinity of Pasco. This is one of the largest projects so far undertaken by the government and involves the construction of a large dam across the mouth of Washtucna Coulee, for the purpose of creating a reservoir in which to store the waters of the Palouse River. The principle obstacle lies in the fact that the coulee is now occupied by the tracks of the Oregon Railway & Navigation Company, a branch line connecting with the Northern Pacific at Cannell. This branch must be moved to higher land if the government engineers go forward with their plans. It is understood that good progress is being made in the negotiations between the Reclamation Service and the Oregon Railway & Navigation Company for the removal of the branch. In all likelihood the work of constructing this irrigation project will be commenced this year.

Surveys have been made for a large number of other projects along the lines of the Northern Pacific Railway, some of which have been found impracticable under present conditions and others possible. Among the latter are two projects for pumping from the Missouri River in North Dakota, one in the vicinity of Fort Buford and the other in the vicinity of Bismark. The engineers are working out the details of these two projects.

In addition to the projects of the Reclamation Service there are a number of irrigation canals under construction by private capital at different Northern Pacific points. At Forsyth, Mont., the canal of the Rosebud Land & Improvement Company, irrigating 12,000 acres, will be completed and in operation this year. The Billings Land & Irrigation Company will also complete a large canal, irrigating 40,-

Green Lake Reservoir Site, Washington.

Junction of Methow and Columbia Rivers, Washington.

000 acres, near Billings, Mont. This company is now placing its lands upon the market. The construction of a large sugar beet factory is now assured and a large irrigated area has been proven to be splendidly adapted to the growing of sugar beets.

On the table lands immediately east of Spokane several canals have been and are now being constructed, utilizing the numerous lakes in that district for storage purposes. Under these

Grand Canyon, North Platte River, Looking Downstream at Site of Proposed Dam, Pathfinder Reservoir, Wyoming.

canals irrigated lands can be purchased at very reasonable terms.

There is still a large area of irrigated land under the constructed canals in the famous Yakima Valley in Washington. An extension of the Sunnyside canal, now one of the largest in the United States, is contemplated this year. This will water 200,000 acres additional.

The Northern Pacific Railway has made arrangements with the United States Department of Agriculture and the State Experiment Station of Montana for conducting a number of experiments in dry-land farming this year in eastern Montana. These experiments will be started within a short time, and it is confidently expected that the results will show that millions of acres of Montana lands heretofore assumed to be valuable for grazing only, are adapted to agriculture. This is predicated upon the fact that the minimum rainfall in eastern Montana is about fourteen inches, that the soil is generally good, and that this method of farming is being profitably conducted in eastern Washington, California, western Kansas, Nebraska and Colorado in districts where the annual rainfall is from nine to ten inches. It is also known that in that portion of North Dakota west of the Missouri River where the rainfall is from fourteen to sixteen inches the

farmers are doing well and although last year was unusually dry, there was a very large increase in the products shipped from the different stations in North Dakota and west of the Missouri. This country is being rapidly settled up by a good class of settlers attracted by the large areas of unoccupied government lands and the low prices at which lands are being sold by the land companies operating there.

It is a constant source of surprise to all who are familiar with the conditions that the settlement of northern Minnesota does not proceed more rapidly. There are millions of acres of excellent lands in northern Minnesota where the timber has been cut off which are waiting for settlers and which are obtainable at very low prices. There appears to have been no systematic effort towards securing immigration in Minnesota, and the result is that settlers have gone and are going farther north into Canada, trying to make homes on lands not nearly as well adapted to their purposes as those they are passing by in Minnesota. An excellent move to cure this condition of affairs would be the establishment of a State Immigration Bureau. The ownership of northern Minnesota lands is so diverse that it would be difficult if not impossible to secure unity of action by the land owners, and as every settler adds to the wealth of the State it is entirely proper that the work of securing them should be borne by the State as a whole.

IRRIGATION IN TEXAS

TEXAS has at present about 300,000 acres of irrigated land, of which 75,000 acres are planted in ordinary crops and 225,000 acres in rice. For years stock raising has been the only industry of the arid and semi-arid portions of the State, but the homesteaders of the last decade have cut up the great ranches into small farms and created a demand for water with which to make their crops grow. Cotton fields are pushing their way now into western Texas. The rice fields are confined for the most part to the coast country, but the belt of irrigated land where general farm products flourish extends from El Paso to the Guadalupe, and from the Rio Grande to the Red River on the north.

Irrigation is, however, no new thing in Texas. It must not be forgotten that the Lone Star State is a commonwealth with the romantic history that befits a border State. Long before it became a republic the Indians were irrigating land along the Rio Grande. Afterward the Franciscan friars who came with the early Spanish conquerors carried on irrigation for the cultivation of their fields in the southwestern part of what is now the State of Texas. In the northern and central parts of the State irrigation has been carried on to a limited extent for many years.

For some time irrigation development in the Pecos and Rio Grande valleys has been retarded by the lack of water supply which the heavy demand on those rivers in New Mexico and Colorado occasions. There are many places, however, in the trans-Pecos country, where impounding dams might be constructed across narrow canyons or gorges to form reservoirs for the storage of flood waters.

In the Pecos Valley and along the Concho in Tom Green County water for irrigation is taken from flowing streams. Big springs supply irrigation systems in the trans-Pecos country and along the San Felipe and San Antonio rivers. Some of the best results in the State are produced by irrigation from artesian wells near San Antonio and in the Rio Grande country from Corpus Christi to Browns-

ville. About 200 good artesian wells have been sunk in this neighborhood in the last five years. Water from artesian wells is in high repute in this local for irrigation purposes.

Gravity systems, pumping plants, and artesian wells are all utilized by farmers who live in the valleys of the Colorado and San Antonio rivers, the most important of the Gulf streams. Agriculturists realize more fully each year the advantage to be derived in years of deficient rainfall from a system of irrigation.

Many of the truck farms in southern Texas are supplied from surface wells, the water of which is pumped into small reservoirs of from 3,000 to 5,000 cubic feet capacity. Over 500 such wells are in use at present. It is estimated that 75 per cent. of the irrigation in Texas during 1904 was accomplished by means of pumping plants, and 70 per cent of the area supplied by pumps was cultivated in rice.

The use of impounding reservoirs has not entered very largely into the irrigation economy of the State, but as the demand for water grows, attention is turned to this source of supply, and the storage reservoir at Wichita Falls will soon be duplicated at scores of other points in Texas. San Saba Valley, above the town of San Saba, is one of the most fertile sections in the world, and definite plans have been made for the construction of a dam across the canyon about 18 miles above the twon to form an immense storage reservoir from which water can be conducted to the valley below. This canyon is about 50 miles in length, and by means of a series of dams and canals it is believed that about 40,000 acres above and below the town of San Saba can be brought under ditch. Irrigators along this stream from the head of the canyon to the springs already take practically the entire normal flow of the stream, making any system in the lower San Saba depedent largely on storage water.

The Llano River in Kimble County supports at present many small irrigation plants, but large systems could be constructed in the vicinity of Junction City to utilize the flow of the South Llano.

The headwaters of the Nueces and Frio are torrential in character and impounding reservoirs can be constructed in the canyons northwest of Uvalde, from which the water could be carried to the valleys above and below the Southern Pacific Railroad. Devils River also offers opportunities for impounding waters and carries a substantial and reliable discharge. It would water lands in the vicinity of Del Rio.

FOREST LEGISLATION IN THE NORTHWEST

FOREST legislation in Washington for the session of 1905 was a result of the efforts of an association of timbermen formed for the purpose of securing some legislation favorable to the timber industry relating principally to right-of-ways. A forest fire bill was introduced during the closing days of the session, and passed practically as introduced, with the exception of the cutting down of the appropriation.

Like many other new states in the West, Washington finds that its requirements in the way of appropriations exceed, very often, its ability to raise the necessary money; and as a result at the close of a session there are always a large number of interests which are unable to get proper consideration, owing to the state of the treasury.

Two years ago, or during the session of 1903, "a forest fire law" was

passed, which provided that county commissioners should be *ex-officio* fire wardens; and provided for a closed season, to be designated by the county commissioners, during which slashing fires could be kindled only permits issued by them. No special fund was was provided for the work, excepting that the land commissioner was authorized to prepare "fire notices" and distribute them through his office. Expenditure on this account, for the two years, was $40. The law was better than nothing at all and succeeded in keeping down fires to a considerable extent; but in some counties the county commissioners did not see fit to do anything in the matter, and hence the law was a "dead letter." Better results were secured during the first year, while the memory of the great fire of 1902 was fresh in the minds of everyone. In 1904, only a few of the counties did anything toward keeping down forest fires.

The law passed in the session of 1905, was introduced as Senate Bill No. 246, by Senator Rands. The bill provides for the appointment, by the governor, of a "Board of Forest Commissioners," consisting of the State Land Commissioner and four electors. The term of office shall be for four years from the date of appointment. The board of forest commissioners shall supervise all matters of State forest protection; and have full power to appoint all employes of the forest service, including fire wardens and deputy fire wardens; and shall make all rules and regulations, for the prevention, control and suppression of forest fires. They shall gather information regarding the timberland owned by the State, through the investigation of the fire officials; report upon damage done by forest fires and illegal cutting and trespassing upon State timberlands.

The fire warden and forester shall receive a salary of $1,500 per year; and shall act as secretary of the Board of Forest Commissioners. He shall have direct charge and supervision of the forest fire service of the State, subject to the rules of the board of forest commissioners. His duties include the posting of notices, the appointment of deputy fire wardens, subject to confirmation by the Forest Commission; auditing of all bills for salary and expenses incurred in suppression of fires, presenting a statement thereof to each county for the payment of their proportion of the expense. And a considerable amount of scientific work covered by the following provisions:

"It shall be his duty to institute inquiry into the extent, kind, value and condition of the timberlands of the State. The amount, in acres, and the kind of timber that is cut and removed each year. The extent to which timberland is being destroyed by fire. And also examine into the protection, quantity, and quality of timber. And he shall make a written report to the State Board of Forest Commissioners upon all such facts, together with detailed information as to the work of the forest fire service of the State."

In each of the timbered counties of the State there shall be appointed during the period, from June 1 to October 1, a deputy fire warden, who shall receive a compensation of $4 per day. Deputy fire wardens shall represent the authority of the Commission, and the State fire warden in their respective districts and shall have authority to employ or impress help for the suppression or control of forest fire. They shall be under the direction of the State fire warden, who shall have power to mass them at any point requiring especial protection.

A fine of $25 for refusing to render assistance, is provided for, when called upon by a forest ranger, and any one needlessly destroying a warning notice shall be liable to a fine not exceeding $100 or to imprisonment not exceeding thirty days.

Provision is made for the appointment of forest rangers and timber cruisers, in the employ of private corporations and individuals, as forest rangers; but without any compensa-

tion for their services. Such officers appointed under this provision shall have power to make arrests, without warrants, of any person violating the act.

The closed season, for burning or slashing, wood and brush land, is fixed from June 1 to October 1 of every year. And in order to make a burning it is necessary to obtain first a permit in writing from a deputy warden of that county. Any person burning without this permission shall be deemed guilty of a misdemeanor and fined in any sum not exceeding $100, or be imprisoned not exceeding thirty days. If in the judgment of the deputy fire warden it is deemed necessary he can designate a deputy who shall have full charge of all burning under any permit, with full power of revocation in case he considers the burning dangerous. The penalty provided for the wilful or negligent setting or starting of fires is not over $500 for any negligent fire; for a malicious fire the maximum fine is $1,000 or imprisonment for one month to one year, or both imprisonment and fine; and also shall be liable for all damages in civil action.

Any person, during the closed season, who shall leave a fire dangerously near or on any forest land, or cause any fire to be set, shall be liable to a fine not exceeding from $10 to $100 or imprisonment not exceeding two months.

It is provided that all locomotives, logging or farm engines or boilers shall be equipped with spark arresters for the months from June to October inclusive; and a fine of from $10 to $50 per day is provided for in case of neglect to operate said locomotives or engines as provided. A section is included taken from the California law, making country prosecuting attorneys liable to presecution, who do not diligently prosecute allged cases of violation under this law.

The original bill called for an appropriation of $25,000; this was reduced in the Senate to $7,500, with $2,500 in another fund, and with a provision that the amount expended in any country for fire suppression or protection, shall be payable, one-third by the country in which it is located and two-thirds by the state. This will make a total of about $6,500 annually for fire protection in the State of Washington. A very inadequate sum when the immensity of the forestry resources are considered. The timbermen of the state are taking steps toward supplementing this amount. In this way it is hoped to raise at least $15,000 per year for the fire protection work.

The Governor has already appointed as Forest Commissioners, Hon. Joseph Irving, of Snoqualmie, and Frank H. Lamb, of Hoquiam. The other appointments will be announced later; the law not taking effect until June, 1905. Washington has made the best start of any state of the Pacific northwest in fire protection, but Oregon and Idaho are closely following in its steps.

OREGON.

In its session of 1903, the Oregon legislature passed, with only six dissenting votes, a Forest Fire Law, modeled largely upon the old Washington law; and which made the Superior Judge, of each county, a "Fire Warden." This was vetoed by Governor Chamberlain on the ground that the state, since it had parted title to all its timber or state lands, was not interested in the protection of the property of a private corporation or individual.

In his message to the legislature of 1905, the Governor again reiterated his position and stated that he would veto any measure appropriating money for the protection of private property; therefore, a law was devised, to obviate these objections, which was passed by the Legislature in its closing days. The county court of each county is authorized and empowered to appoint fire rangers in their respective counties; said fire rangers to be paid by the timber owners so apply-

ing for their appointment, and in no case to be paid by the county clerk, and shall hold office for the period of one year from the date of their appointment, unless sooner removed. The county judge shall have all the powers and duties of the county court during time said court is not in session. And the county clerk shall keep a record of all fire rangers qualified within his jurisdiction. It shall be his further duty to issue written or printed permits, during the permit season, to any person wanting to set out fires. Such permits to be issued from June 1, to August 1; and shall fix the time of setting out of fire at a day named; and not more than ten days from the date of the permit. The provision for setting fires at a certain time of day was lost in the committee. Upon the granting of a permit, the clerk shall notify a fire ranger in the vicinity of the proposed fire, who shall watch the burning of said fire. The fire ranger shall have complete power and authority to arrest, without warrant, persons who violate the provisions of the act. And from June 1 to October 1, of each year, it shall be unlawful for any person to operate a spark emitting locomotive, logging, farm or stationary engine located in a timber district, without a reasonably safe spark arrester. The law also provides fines, for the setting out either negligently or maliciously of forest fires, similar to the Washington law.

The Oregon act attempts to accomplish, without expense to the state, the work that is as much a duty of the state, as is the duty of a municipality to protect the private property therein from destruction by fire.

IDAHO.

In Idaho a forest fire bill was introduced, by Senator Page, almost identical with the Washington Fire Law of 1903. But this although passed in the Senate did not carry in the House. And the result was a compromise upon House Bill No. 131, which united several acts relatings to public lands. The portion of this act relating to forest protection, provides that all camping parties, either for business or pleasure, must take out a permit to camp. And grants to probate judges, justices of the peace, game wardens and deputy wardens of the State, the power of issuing these permits upon the payment of fifty cents as a fee. It further provides for the printing and distributing by the State Auditor, of books containing these licenses. The State Land Commissioner, his assistants, land appraisers and collectors, game wardens and *ex officio* deputies and all police officers of the State are charged with the enforcement of the forest protection as relates to forest fires; and shall have power to arrest violators of the provision of the act and deliver them to a constable.

Section 13, Provides that the right-of-way of any railroad in the state shall be kept clear of any inflammatory material, and every locomotive used in a forest area, shall be equipped with a sufficient spark arrester.

For the purpose of carrying out the provisions of the act the State Board of Land Commissioners are authorized to employ, not exceeding six persons, at any one time, at a sum not exceedings $5 per day, and who shall be empowered to arrest any violator of the provisions of the act. Penalties are provided for the negligent or malicious setting of fires and allowing them to spread. Prosecuting attorneys are directed to prosecute in the name of the State all cases arising under the act.

So far as Washington is concerned it is felt that the forest work is under test and it is the desire of all connected with the service that good results may be accomplished.

There has just been inaugurated in Seattle, a State Forestry Association, which intends to take up the scientific part of the work and hopes to provide for the publcation of the results gathered by the Forest Commission and the fire service.

PLANTING RED PINE

THE red, or Norway pine (*Pinus resinosa*), as it is sometimes called was first described in 1755 by Duhamel. It usually attains an average height of 70 to 90 feet and a diameter three feet from the ground of 15 to 24 inches. The stem is straight, scarcely tapering, covered by a reddish-brown bark, which in old trees readily separates on the surface into thin, flat, loose scales, giving the trunk a conspicuous appearance. The branches are coarse, extending horizontally or slightly declined, forming a broad based or conical head. The leaves in twos protruding from close, elongated, persistent, conspicuous sheaths, are slender, flexible, dark green, and lustrous, 5 to 6 inches long. The cones are borne near the extremity of the shoots at right angles to the stem, maturing the second year, and 1 to 3 inches long; in shape ovate to oblong conical; when opened broadly oval or roundish; scales not hooked or pointed, thickened at the apex.

RANGE.

The natural range of the red pine is from Nova Scotia and New Brunswick westward to Manitoba, and Southward to the Great Lake region. It extends somewhat further north than the white pine, being found on the height of land well north of Lake Winnipeg, but not so far north as the jack pine. In the east it extends through northern New England and New York, southward to eastern Massachusetts and the mountains of Pennsylvania. It does not, however, extend as far south as the white pine. It is found most abundantly and grows to its largest size in the northern portion of the Lake States, often forming pure forests many acres in extent.

One peculiarity of this tree is that it prefers to grow in groves unmixed with other trees, although some white pines are occasionally mixed with the red. It is also found frequently growing in groves of mature jack pine, having come in under its partial shade, and when once beyond the critical period it rivals the jack pine and may finally overtop it.

The red pine is adapted for planting in the natural pine regions of New England, the St. Lawrence Valley, Michigan, Wisconsin, and Minnesota.

SILVICAL QUALITIES.

The red pine type is found on loamy, sandy plains and on the ridges of sandy and gravelly loam. In regions where the hardwood, white pine, red pine and the jack pine types are present they become more xerophytic in character in the order named. It is frequently found, however, growing to the very edge of the swamps where their root system can reach the water level. The red pine is a light-demanding species, bearing less shade than white pine but more than jack pine. The seedlings in order to grow must have plenty of light. The young stand in the natural forest, as a rule, forms rather heavy shade, but the mature forest is decidedly open. In fully stocked stands under 100 years old there is not enough light admitted to permit a dense undergrowth, but soon after 115 years brush growth appears and gradually extends throughout the stand. This intolerance of shade is a disadvantage in competing with other species, but as soon as the tree gets started its rapid growth enables it to keep its crown free to the light. The rapidity of growth of red pine, in its earlier stage of development, is an important feature. The rate of growth in height will vary, for seedlings, according to the amount of light they receive. Under partial shade the growth is extremely slow. If the seedlings are in dense clumps they will grow faster than when scattered. During the first fifteen years after natural seeding on sandy soil, the red pine grew .97 feet per year, while the jack

pine grew 1.32 feet. On the other hand, the individual red pine has a faster height and diameter growth than white pine. The following results were shown by measurements taken in New England on plantations:

Species	No. of Trees	Age	Ave'ge Height	Ave'ge Diam'r
		Years	ft.	inches
White pine	40,578	30	26.6	3.73
Red pine.....	4,548	30	35.4	5.88
White pine	1,758	27	*43.5	5.18
Red pine..	19	27	*48.0	6.60

*Better growth due to richer soil.

It may be stated that during the first 50 years the jack pine grows fastest, the red pine second, and the white pine last. White and red pine live to about equal age, 280 to 310 years, while the jack pine rarely exceeds 90 years of age.

The following figures on the relative yield of red and white pine were secured in northern Minnesota:

Species	Age	Ave'ge Height	Ave'ge Diam'r	No. of Trees	Vol'me
	Years	ft	inches		bd. ft.
Red pine...	119	93	13.3	285	49,065
White pine.	120	87	15.0	165	3,465
Difference in favor of Red pine..	1	1	2	120	14,415

On the whole, the white pine is no match for the red pine as far as growth is concerned.

The red pine may be said to have no serious enemies, it is peculiarly free from the attacks of fungi, and resists fire to a marked degree. When young, however, it is sometimes injured by a white grub which feeds on the tender roots. There is apparently no climate too cold either for the young seedlings or for the mature trees.

ECONOMIC USES.

The red pine is usually cut into dimension stuff and sells for 15 to 20 per cent. less in the open market than does the virgin white pine. It is stronger than white pine, is hard, and takes a high polish. In Canada the timber is put to a greater variety of uses and is of more importance than in the United States, forming one of their chief export timbers. The quality of the timber may be graded between the longleaf and the western yellow pine.

METHODS OF PROPAGATION.

The red pine as a rule is propagated from seed. The seeds, produced in comparatively scanty crops, are shed with the ripening of the cones. They fall the same year that they mature and are followed by the cones which are not persistent. There seems to be some question as to just the length of time between seed crops. However, the most authentic reports state that the seed is borne at intervals of 2 to 4 years. The seed is difficult to obtain, both on account of the low production and the ravages of squirrels. Squirrels are especially destructive of the seeds. The cones are free from resinous sap and are not armed with sharp hooks or points. The trees begin bearing seed at a much later age than the jack pine, producing seed somewhat larger than jack but smaller than white pine.

The red pine cannot compete with the jack pine in naturally reforesting burned-over areas. Many of the jack pine cones do not open ordinarily until the tree is scorched or killed by fire. A crop of cones is produced every year on the jack pine, and a large surplus is thus provided against this contingency. The seeds, shed from the open cones in the ashes of a fire, have the first and best chance for soil space, while the red pine, although it may be abundant in the vicinity, often shows not a single seedling. One pound of red pine seed contains about 40,000 seeds, of which about 80 per cent. will germinate under favorable circumstances. The amount of seed to sow under average conditions is given below:

Manner of Sowing.	Ounces per		Average number of seedlings per			
			Running Foot		Square Foot	
	Running Foot	Square Foot	First Year	Second Year	First Year	Second Year
In drills..	1-8-1-28	1-4-1-7	16-22	8-10	80-20	35-45
Broadcast						

The young seedlings at once produce a strong tap root. But the wind-firm character of healthy, mature red pine is not due to an especially strong tap root, but rather to a number of stout laterals. A thrifty, forest-grown tree suddenly isolated will often bend or break off rather than pull up by the roots; yet even a small crown at the top of a long stem will exert a powerful overturning force during a wind storm.

PLANTING.

The seeds should be sown early in the spring in a well prepared seed-bed, after the manner of white pine. The seedlings, however, do not demand the degree of shade which is essential to the growth of the white pine. Robert Douglas' Sons state that there is less danger from damping off of the seedlings than with other pines. The great risk usually surrounding the planting of seed directly on the final site of the mature tree makes it advisable to raise the seedlings in the nursery beds. The best stock to plant is seedlings 2 years old, 1-year transplants. On poor soil it is believed that the best results may be secured by planting red pine 5 feet apart each way; on richer soil it is best to space them wider. The greater cheapness of wide planting it, of course, a consideration if the desired results may be as amply attained. For forest plantations it is best planted pure, but might be profitably planted alternating with sugar maple.

The red pine has been more extensively planted in landscape work than in forest plantations. Where picturesque and natural landscapes are wanted there is no eastern pine that can take its place; it is the sturdiest, boldest eastern conifer.

CULTIVATION AND CARE.

When planted on cut-over lands, care should be taken that it is not choked out by the more rapid-growing species, such as jack pine, poplar, and birch. It needs no cultivation. The only protection necessary is from fire and grazing.

EXAMPLES.

In comparison with other conifers, such as the white pine, jack pine, larch, and spruce, the red pine has been very sparingly planted in forest plantations; but has doubtless been more used in landscape work than any one of the above-named species.

Mr. Isaac Adams, of Moultonboro, N. H., planted the red pine in mixture with the white pine. He found that the red pine overtopped the white pine, showing an average growth of 34.9 feet, while the white pine showed 27.5 feet.

The red pine was planted in the spring of 1891, in Holt county, Nebraska, alternating in furrows with jack pine, Scotch, Austrian, and western yellow pine. The seedlings were 8 inches high when planted. The number of red pine planted was 315; the number living October 15, 1891, was 54, or 14.4 per cent. of those planted. These seedlings were all in good condition.

By accident some red pine seed found its way to the seedbeds of the Dismal River Reserve, in Nebraska, with the jack pine seed that was planted in the spring of 1903. The stray plants were not noticed until the spring

of 1904. All the jack pine seedlings were winter-killed, while some 40 to 50 plants of red pine came through the winter without injury, and during the summer of 1904 made a growth ranging from 6 to 14 inches in height at the close of the season. From this example, the vigor of these plants would indicate that the red pine may be a good tree for planting on the sand hills of Nebraska and the adjacent regions.

RELATION OF THE LAW TO UNDERGROUND WATERS

A REPORT of great practical value called "Reclamation of the Law to Underground Waters," by Mr. Douglas Wilson Johnson, has just been published by the United States Geological Survey.. It is the first comprehensive paper prepared in this country on the relation of the law to underground waters, and was complied to meet a considerable demand for information on this subject. It is especially pertinent at this time, when active efforts are being made in several States to enact laws governing the use of underground waters which shall take account of the recent advances in the science of hydrology and the present knowledge of the occurrence and movements of such waters. The report is in no sense, however, a legal treatise, but rather the result of an endeavor to collect and arrange such legal decisions as will serve to shown the relation of the law to problems which are essentially geological in character.

Mr. Johnson divides his discussion into two parts. In the first part he assembles the common-law rules concerning underground waters; in the second he rehearses the legislative acts affecting underground waters. He divides undergrounds waters into two classes, those flowing in defined and known channels, and those passing through the ground below the surface, either without definite channels or in courses which are known, and he arranges all the laws relating to underground waters as above.

This report brings into striking relief the fact that there is a great lack of agreement among authorities on questions pertaining to underground waters. This is because there is so much that is uncertain and indefinite in the behavior of waters hidden beneath the surface. A second and very important reason for the unsatisfactory condition of the law relating to underground waters is found in the fact that the state of our knowledge regarding such waters is now, thanks to the progress of geological science, in advance of the general ruling of the courts on some of the questions involved. Where a decision is controlled by opinions rendered in former cases, and not made with due regard to the present knowledge respecting subterranean conditions, it does not seem that a just settlement of the controversy can be reached.

There probably must always be cases in which the subterranean conditions are indefinite or unknown, but the number of such cases will decrease with advance in geologic knowledge. The lack of agreement among legal authorities on many of the questions at issue is rather more fortunate than unfortunate in one respect at least, since it bears witness to the uncertain position of the law on the points involved and opens the way more readily for new knowledge concerning the problems, and a wiser interpretation of the law.

DEPARTMENT OF THE INTERIOR, WASHINGTON, D. C., April 27, 1905. United States Geological Survey, Reclamation Service. Sealed proposals will be received at the office of the Supervising Engineer, United States Reclamation Service, Chamber of Commerce Building, Denver, Colo., until 2 o'clock, p. m., Thursday, June 15, 1905, and thereafter opened, for the construction of the Pathfinder dam and auxiliary works, at a point about 50 miles southwest of Casper, Wyo., to impound the flow of North Platte River. Plans, specifications and forms of proposal may be obtained by application to the Chief Engineer of the Reclamation Service, U. S. Geological Survey, Washington, D. C., or to the Supervising Engineer of the Reclamation Service, at Denver, Colo. Each bid must be accompanied by a certified check for $5,000, payable to the order of the Secretary of the Interior, as a guaranty that the bidder will, if successful, promptly execute a satisfactory contract and furnish bond in the sum of $50,000 for the faithful performance of the work. Each bid must also be accompanied by the guarantee of responsible sureties to furnish bond as required, if bid be accepted. The right is reserved to reject any or all bids, to accept one part and reject the other, and to waive technical defects, as the interests of the service may require. Bidders are invited to be present when bids are opened. Proposals must be marked "Proposals for Pathfinder dam, Wyoming." E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, United States Geological Survey, Reclamation Service, Washington, D. C. April 29, 1905. Sealed proposals will be received at the office of the Engineer, United States Reclamation Service, Hazen, Nevada, until 2 o'clock p. m., June 15, and thereafter opened, for the construction of outlet and controlling works and bridge at Lake Tahoe, Tahoe City, California, involving about 90,000 cubic yards of earthwork, 500 cubic yards of concrete, etc. Plans specifications and forms of proposal may be inspected at the offices of the Reclamation Service in Washington D. C., and Hazen, Nevada. Each bid must be accompanied by a certified check for $500, payable to the order of the Secretary of the Interior, as a guarantee that the bidder will, if successful, promptly execute a satisfactory contract, and furnish bond in the sum of $5,000 for the faithful performance of the work. The right is reserved to reject any or all bids, to accept one part and reject the other, and to waive technical defects, as the interests of the service may require. Proposals must be marked "Proposals for Lake Tahoe outlet works, Truckee-Carson project." E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, United States Geological Survey, Reclamation Service, Washington, D. C., April 29, 1905. Sealed proposals will be received at the office of the Engineer, U. S. Reclamation Service, Billings, Mont., until 2 o'clock p. m., June 28, 1905, and thereafter opened, for the construction of about 30 miles of canal, involving about 700,000 cubic yards of earthwork, some rock work and three tunnels, the same being a portion of a system for the diversion of about 400 cubic feet of water per second from the Yellowstone River at a point about ten miles east of Billings, and its conveyance to irrigable lands along the south side of said river. Specifications, forms of proposal, and plans may be obtained at the office of the Chief Engineer, U. S. Reclamation Service, Washington, D. C., or from R. S. Stockton, Engineer, Billings, Mont. Each bid must be accompanied by a certified check for $1,000, payable to the order of the Secretary of the Interior, as a guaranty that the bidder will, if successful, promptly execute a satisfactory contract and furnish bond as required. It must also be accompanied by the guaranty of responsible sureties to furnish bond as required, if the bid be accepted. The right is reserved to reject any or all bids, to accept one part and reject the other, and to waive technical defects, as the interests of the service may require. Bidders are invited to be present. Proposals must be marked "Proposals for the construction of canal, Huntley project, Montana." E. A. HITCHCOCK, Secretary.

DEPARMMENT OE THE INTERIOR, United States Geological Survey, Reclamation Service, Washington, D. C.. April 27, 1905. Sealed proposals will be received until 2 o'clock p. m., June 1, 1905, and thereafter opened, at the office of the Engineer, U. S. Reclamation Service, Glendive, Mont,, for installing, in connection with the Fort Buford reclamation project, a telephone system having four telephone stations and about 70 miles of pole line, beginning opposite Glendive, Mont., on the west side of the Yellowstone River, extending northward down the Yellowstone Valley, generally following the county road and ending at the junction of the Yellowstone and Missouri Rivers at a point nearly opposite Buford, N. Dak., on the Great Northern Railroad. Specifications, form of proposal and particulars may be obtained by applying to the Chief Engineer of the Reclamation Service, Washington, D. C., or to F. E. Weymouth, Engineer, Glendive, Mont. Each bid must be accompanied by a certified check for $1,000, payable to the order of the Secretary of the Interior, as a guaranty that the bidder will, if successful, promptly execute a satisfactory contract and furnish bond in the sum of 20 per cent of the contract price for the faithful performance of the work. Each bid must also be accompanied by the guaranty of responsible sureties to furnish bond, as required, if the contract is awarded to the bidder. The right is reserved to reject any and all bids and to waive technical defects if the interest of the Government requires it. Bidders are invited to be present at the opening of the proposals. Proposals must be marked "Proposals for Telephone System, Fort Buford Project, Montana and North Dakota." E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, United States Geological Survey. Washington, D. C., May 1, 1905. Sealed proposals will be received at the office of the United States Reclamation Service, 1108 Braly Building, Los Angeles, Cal., until 2 o'clock p, m., Monday June 5, 1905, for the construction of the Laguna Dam and Sluiceways, involving the excavation of about 282,000 cubic yards of earth excavation of about 305,000 cubic yards of solid rock, placing of about 305,000 cubic yards of solid rock in the dam and masonry core walls, building of about 27,150 cubic yards of concrete, laying of about 80,000 square yards of paving, and furnishing and driving of about 53,000 linear feet of sheet-piling, for the diversion of a part of the Colorado River about 10 miles northeast of Yuma, Ariz, *Bids will be received for the entire work or any integral part thereof.* Specifications, form of proposal, and particulars may be obtained by application to the Chief Engineer, U. S. Reclamation Service, Washington, D. C.,; to J. B. Lippincott, Supervising Engineer, U. S. Reclamation Service, 1108 Braly Building, Los Angeles, Cal., or to Homer Hamlin, Engineer, U. S. Reclamation Service, Yuma, Ariz., at whose offices the plans may be inspected. Each bid must be accompanied by a certified check for $10,000, payable to the order of the Secretary of the Interior, as a guaranty that the bidder will, if successful, promptly execute a satisfactory contract and furnish bond in the sum of 20 per cent of the contract price for the faithful performanee of the work. The right is reserved to reject any or all bids, to accept one part and reject the other, and to waive technical defcets, as the interests of the service may require. Proposals must be marked "Proposals Laguna Dam, Yuma Project, California," Bidders are invited to be present when bids are opened. E. A· HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR. United States Geological Survey, Reclamation Service, Washington, D. C., April 29, 1905. Sealed proposals will be received at the office of the Engineer, United States Reclamation Service, Billings, Montana, until 2 o'clock p. m., June 28, 1905, and thereafter opened, for the construction of pumping station, concrete culverts, siphons, drops, etc., and furnishing two steel highway bridges, four steel sluice gates with stands, and 120,000 pounds steel bars for reenforcing concrete. Total amount of concrete about 1,600 cubic yards. Above work to be done along line of canal east from Huntley, Montana, in connection with the Huntley project. Specifications, form of proposal, and plans may be obtained at the office of the Chief Engineer of the Reclamation Service, Washington, D. C., or from R. S. Stockton, Engineer, Billings, Montana. Each bid must be accompanied by a certified check for $1,000, payable to the order of the Secretary of the Interior, as a guatanty that the bidder will, if successful, promptly execute a satisfactory contract and furnish bond in the sum of $10.000 for the faithful performance of the work. It must also be accompanied by the guaranty of responsible sureties to furnish bond as required if the bid be accepted. The right is reserved to reject any or all bids, to accept one part and reject the other, and to waive technical defects, as the interests of the service may require. Bidders are invited to be present. Proposals must be marked "Proposal for building structures and furnishing material, Huntley project, Montana." E. A. HITCHCOCK. Secretary.

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DEPARTMENT OE THE INTERIOR. United States Geological Survey, Reclamation Service, Washington, D. C., April 29, 1905. Sealed proposals will be received at the office of the Engineer, United States Reclamation Service, Billings, Montana, until 2 o'clock p. m., June 28, 1905, and thereafter opened, for the construction of pumping station, concrete culverts, siphons, drops, etc., and furnishing two steel highway bridges, four steel sluice gates with stands, and 120,000 pounds steel bars for reenforcing concrete. Total amount of concrete about 1,600 cubic yards. Above work to be done along line of canal east from Huntley, Montana, in connection with the Huntley project. Specifications, form of proposal, and plans may be obtained at the office of the Chief Engineer of the Reclamation Service, Washington, D. C., or from R. S. Stockton, Engineer, Billings, Montana. Each bid must be accompanied by a certified check for $1,000, payable to the order of the Secretary of the Interior, as a guatanty that the bidder will, if successful, promptly execute a satisfactory contract and furnish bond in the sum of $10.000 for the faithful performance of the work. It must also be accompanied by the guaranty of responsible sureties to furnish bond as required if the bid be accepted. The right is reserved to reject any or all bids, to accept one part and reject the other, and to waive technical defects, as the interests of the service may require. Bidders are invited to be present. Proposals nust be marked "Proposal for building structures and furnishing material, Huntley project, Montana." E. A. HITCHCOCK. Secretary.

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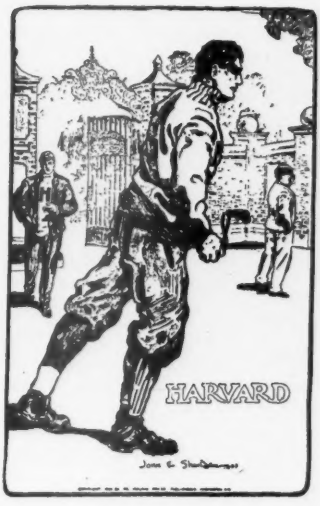

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Secretary.

The objects of the Association, as set forth in its Constitution, are as follows:

1. The adoption by the Federal Government of a permanent policy for the reclamation and settlement of the public domain, under which all the remaining public lands shall be held and administered as a trust for the benefit of the whole people of the United States, and no grants of the title to any of the public lands shall ever hereafter be made to any but actual settlers and homebuilders on the land.

2. The preservation and development of our national resources by the construction of storage reservoirs by the Federal Government for flood protection, and to save for use in aid of navigation and irrigation the flood waters which now run to waste and cause overflow and destruction.

3. The construction by the Federal Government of storage reservoirs and irrigation works wherever necessary to furnish water for the reclamation and settlement of the arid public lands.

4. The preservation of the forests and reforestation of denuded forest areas as sources of water supply, the conservation of existing supplies by approved methods of irrigation and distribution, and the increase of the water resources of the arid region by the investigation and development of underground supplies.

5. The adoption of a harmonious system of irrigation laws in all the arid and semi-arid states and territories under which the right to the use of water for irrigation shall vest in the user and become appurtenant to the land irrigated, and beneficial use be the basis and the measure and limit of the right.

6. The holding of an annual Irrigation Congress, and the dissemination by public meetings and through the press of information regarding irrigation, and the reclamation and settlement of the arid public domain, and the possibilities of better agriculture through irrigation and intensive farming, and the need for agricultural education and training, and the creation of rural homes as national safeguards, and the encouragement of rural settlement as a remedy for the social and political evils threatened by the congestion of population in large cities.

SUDWARTH PRINTING COMPANY, WASHINGTON, D. C.